Evaluating Your Cost
Information for page 75

February, 1961

ROADS AND STREETS

A GILLETTE PUBLICATION

UNIVERSITY MICROFILMS
EUGENE B. POWER
313 N. 1ST ST.
ANN ARBOR, MICH.
COMP-TRVL-II-60

RENT A JACKSON

IT'S A SOUND, NO-RISK WAY OF DISCOVERING THE FASTEST, MOST EFFECTIVE AND BY FAR THE MOST INEXPENSIVE METHOD OF COMPACTING GRANULAR SOILS; BASE COURSES, FILLS AND SOIL-CEMENT MIXES.

Changing from the 13 ft., 3 inch working width to 88 inches overall for road travel or maneuverability on the job is accomplished hydraulically in just 30 SECONDS.

The new widening attachment (optional at added cost) is raised or lowered instantly. Makes the JACKSON by far the most efficient compactor for widening projects.

As one contractor on a federal highway project put it: "We rented this vibratory compactor from our dealer just for this job, but we're so pleased with its performance that we'll probably buy it. It has the versatility and punch to handle all our compacting, both big and small jobs, on slopes and level ground — QUICKLY."

VERSATILITY? Look at the illustrations. Then consider, too, that the individual compactor units may be fitted with operating handles and used as self-propelling units to compact the tight places other equipment can't touch. Also that the JACKSON operates in either direction, no deadheading or turning around is required.

PUNCH? 4200 3-TON BLOWS PER MINUTE from each of the compactor units provide extremely high productivity. 100% of specified density is frequently attained in a single pass. And the JACKSON does not leave the top 1-inch of the lift in a loose condition . . . a very important consideration. Maintenance and operational costs are extremely low.

Discover the outstanding time-and-money-saving opportunities afforded by the JACKSON MULTIPLE COMPACTOR by renting one from your Jackson Distributor. Name and further details on request.

. . . for more details circle 314 on enclosed return postal card

JACKSON VIBRATORS, INC.

LUDINGTON, MICHIGAN

So durable it outlives the project . . .

Galvanized Beth-Cu-Loy Drainage Pipe

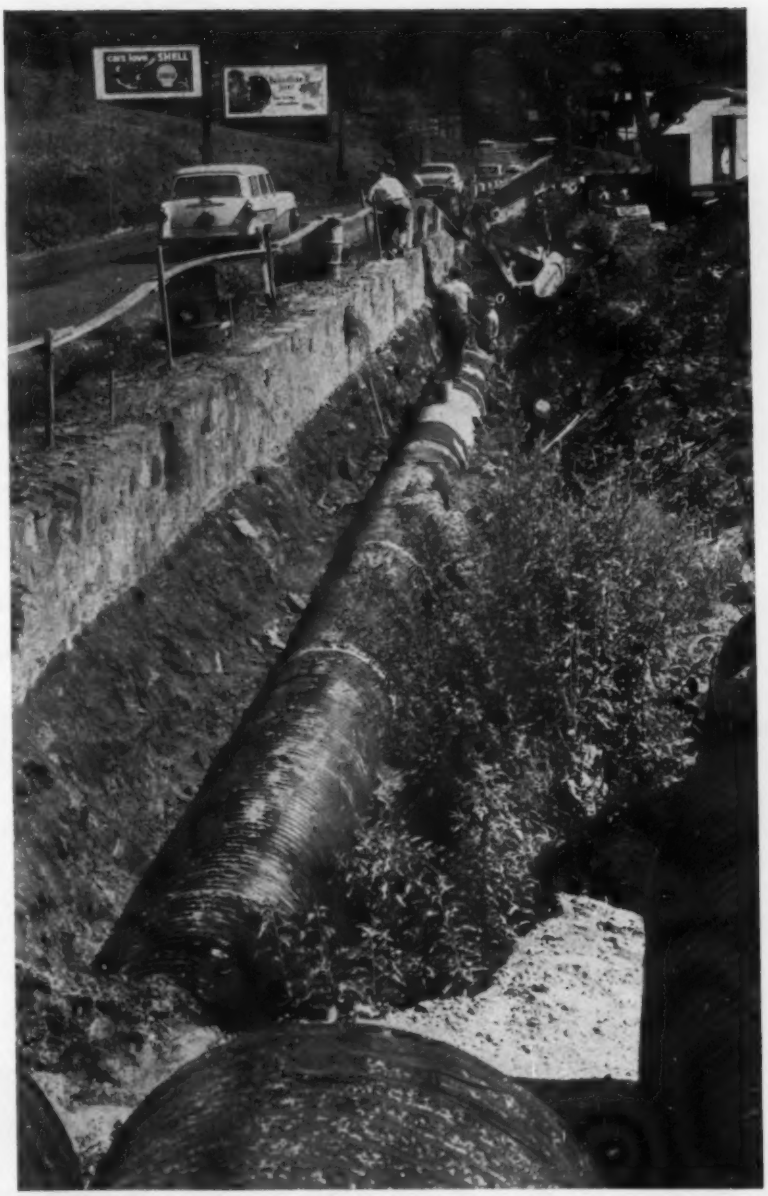
For over 50 years thousands of corrugated metal pipe installations have been studied. These studies show clearly that drainage structures made of galvanized corrugated Beth-Cu-Loy steel sheets are as durable as you could want. That's one reason why you can figure that Beth-Cu-Loy pipe will probably outlive the original drainage need.

A Beth-Cu-Loy drainage structure gets its durability from two sources. First, the strong copper-bearing steel sheet itself; second, the tightly-adherent corrosion-resisting zinc coating (2 oz per sq ft by triple spot test). These two ingredients combine to give you a pipe that is strong, long-lasting, light in weight, flexible.

And flexibility is important, too. It is the flexibility of a Beth-Cu-Loy pipe that transfers some of the imposed load to the surrounding material. Many states actually specify the use of corrugated steel pipe under fills of less than 2 ft or more than 15 ft. The product lends itself to the pipe-arch design where low headroom is a factor.

A Beth-Cu-Loy pipe is easy to handle and install; requires a minimum of engineering. Field joints can be made in minutes without delays for setting or curing. The Beth-Cu-Loy sheets conform in all respects to the specs of the AASHO. Ask your fabricator for full details about drainage structures made from corrugated galvanized Beth-Cu-Loy.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation



Tar-enameled Beth-Cu-Loy corrugated steel pipe being installed as storm sewer along eastern Pennsylvania road. The pipe should easily outlast this drainage need.

Galvanized Steel

for strength
. . . economy
. . . versatility

BETHLEHEM STEEL

BETHLEHEM STEEL

. . . for more details circle 281 on enclosed return postal card

ROADS AND STREETS FEBRUARY, 1961

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

Industry Affairs

19 Washington Newsletter (Special Report)

Contractor Management, Equipment Utilization, Job Methods

54 Controlled Blasting Helps Speed Twin Tunnel Job
57 How Lost Days Affect Your Hourly Equipment Costs
65 Epoxy Resin Adhesive Ties Widening Strip to Old Slab
75 Approaches for Evaluating Cost Information
86 Tips in Buying Workman's Compensation
88 How Radio Brings Order to Complex Urban Job
94 Adjustable Forms Aid Beam Production
135 Freeway Job Gets 260,000 Feet of Tiling
139 Grader-Mounted Cutter Permits Neat Pavement Removal
140 Multi-Layer Asphalt Paving for Oklahoma I-35

Engineering, Technical, Maintenance

58 New Waterproofing Methods for Thruway Bridges
68 Tailored Lighting for New York Thruway Section
81 Resilient Cable-and-Fence Barrier, Median Answer
100 New AASHO "Guide" Spells Out Job Procedures
108 Bin Walls Help Win Canyon Space Battle
114 Continuously Reinforced Concrete Paving Job

Departments

27 People
46 New Publications
53 Editorial (Don't Make a Single Contractor the Goat)
124 Court Decisions
136 Views and Comments, by H. G. Nevitt

Where to Buy It

150 Reader Inquiry Card
150 New Products
180 Manufacturers' Literature
181 With the Manufacturers and Distributors
167 Clearing House
182 Advertisers' Index

FRONT COVER SCENE

Compacting cement-treated pit-run material for base construction, part of widening project for Highway 40 near Martinez, California. Roller is a Model PR-11 self-propelled unit by Southwest Welding & Manufacturing Division, Yuba Consolidated Industries, Gordon H. Ball, contractor.

Accepted as Controlled Circulation Publication at Milwaukee, Wisconsin. Published monthly. Subscription $6.00 per year ($7.00 foreign.) Form 3579 requested to be returned to Gillette Publishing Company, 22 W. Maple St., Chicago.

180° SPEED SWING

ALL-PURPOSE MATERIAL HANDLER

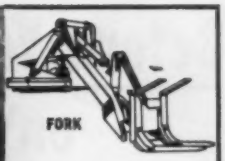
One of the most revolutionary developments in the material handling field is the Pettibone 180° Speed Swing. Today it is recognized as the *most versatile, most productive* all-purpose material handler in the business . . . and the reason is plain:

The *exclusive* Pettibone 180° swinging boom permits the Speed Swing to work in close quarters, on difficult job sites, and under conditions which virtually rule out the use of front-loading equipment! The Speed Swing stands "pat" and swings into the job, getting it done *faster* because there is no costly time wasted in gee-hawing or maneuvering around. The operator *swings the load,* not the machine! He is finished and off to your next job in record time . . . which means greater operating profit for you.

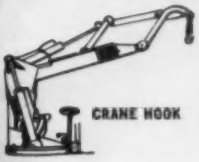
The same performance holds true with the use of any one of the 10 *quickly-interchangeable* attachments that give the Speed Swing its outstanding *all-job versatility!*

Consider all these Speed Swing features: TORQUE CONVERTER—POWER SHIFT TRANSMISSION — 4-WHEEL DRIVE with PLANETARY AXLES — 3 FORWARD AND REVERSE SPEEDS—4-WHEEL POWER STEERING —4-WHEEL POWER BRAKES — FULL HYDRAULIC CONTROL—BIG FLOTATION TIRES. Then add the big feature that others can't—the *exclusive* 180° swinging boom, and you'll agree—THE SWING'S THE THING!

Get the whole picture with all the facts on the Speed Swing's *proved profit-making performance.* Write for complete information today!


FORK

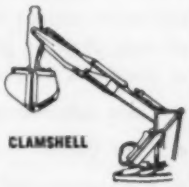
BUCKET

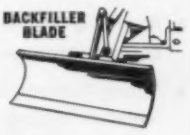

CRANE HOOK

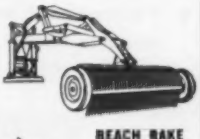
18' BOOM EXTENSION

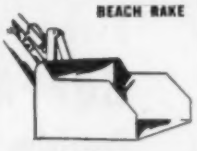
WIRE & PIPE HOOK

BACKHOE


CLAMSHELL


BACKFILLER BLADE


BEACH RAKE


4 CU. YD. SNOW BUCKET

PETTIBONE MULLIKEN CORPORATION

4700 W. DIVISION ST. CHICAGO 51, ILLINOIS

SPaulding 2-9300

. . . for more details circle 333 on enclosed return postal card

Before You Buy Demand Facts on Spreader Performance

. . . Nothing on the market today can match the performance of the Flaherty Spread-Master!

Investigate. Ask for a factual account of performance when you look for a spreader. As a cost-conscious buyer, you can't afford any machine that can't prove its worth.

With the Flaherty Spread-Master, spreading is a continuous operation. Gravel and baffle plates assure uniform application of material, eliminate the need for drag brooms, patch trucks, or hand labor. Front and rear wheel widths are staggered to avoid wheel tracks. A much tighter and smoother surface is obtained. Large aggregates go in the oil first; fines on top. And on job after job, Spread-Master has proved savings of 20% in materials over other methods.

- Easily adjusted radial cut-off gates permit spreads from 6 inches to 13 feet.
- 13-Ft. spread hopper has ample material storage for continuous spreading.
- A 6" spread roll and full-width rod screen assure uniform flow of material.
- Receiving hopper has big capacity; 2 independently operated 20" conveyors carry material to front hopper.
- Spring-loaded truck hitch permits hooking and unhooking of aggregate trucks without stopping. Pulls trucks out of gear — cuts maintenance.
- 5 forward and reverse speeds with mid-ship shuttle gear transmission; ample power to handle tandem-axle units.

Flaherty Manufacturing, Inc. Branch
BUFFALO-SPRINGFIELD CO.
Pocatello, Idaho
A Division of KOEHRING *Company*

F100

. . . for more details circle 317 on enclosed return postal card

ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 69 years of continuous publishing in the highway field; combined with Engineering and Contracting and Good Roads Magazines, established in 1892.

HAROLD J. MCKEEVER, *Editorial Director*
JAMES R. CUMMINGS, *Associate Editor*
FRANK REID, *Associate Editor*
DUANE L. CRONK, *Washington Editor*
DOUGLAS MCDONOUGH, *Assistant Editor*
HELENA JUNG, *Production Editor*
BERNARD A. WEDELL, *Products Editor*
GEORGIA ZOGRAFOS, *Editorial Secretary*
JAMES P. AP ROBERTS, KENNETH F. PARK, H. K. GLIDDEN, H. G. NEVITT, R. L. PEURIFOY, *Contributing Editors*
CHARLES T. MURRAY, *Managing Editor Emeritus*

BPA

Gillette Publishing Company
A Subsidiary of
The Reuben H. Donnelley Corporation

Publication and Editorial Offices:
22 West Maple Street, Chicago 10, Ill.

Chicago Office: 22 West Maple St. Superior 7-1581. R. T. Wilson, Gen. Sales Manager; Fred H. Bowes, Representative; E. Bender, Clearing House Manager; J. L. Latta, Production Manager; L. R. Vickers, Circulation Manager; A. W. Lehmann, Research Director.

New York Office: 15 E. 40th St., New York 16, N. Y., Oregon 9-7750. F. A. Michel Jr., Eastern Manager.

Cleveland Office: Trace Building, 3100 Wooster Rd., Cleveland 16, Ohio, Edison 1-2267, Ray Keine, Manager.

West Coast Office: 1126 Del Rey, Pasadena, Calif., Sycamore 4-6328, J. A. Osborne, Manager.

Officers: Curtiss E. Frank, Chairman of the Board; Gaylord Donnelley, Vice Chairman of the Board; Hamilton B. Mitchell, President; Edward A. O'Rorke, Operating Vice President; Fred C. Ash, Secretary-Treasurer and General Counsel; Karl G. Clement, Controller.

Gillette Publishing Company
HALBERT S. GILLETTE,
Vice President and Publisher

OTHER GILLETTE PUBLICATIONS

Rural Roads • Street Engineering
World Construction • Caminos y Construcción Pesada

BRIDGE SEALING PROBLEMS?
SOLVED! with ALLIED JET SEAL® and
NEW COMPACT ALLIED-STROUD APPLICATOR

Allied JET SEAL is the Original two-component, polysulfide, polymer-type, joint sealing compound. The Allied-Stroud Applicators (Models X691-E and 8591-D) are manufactured by Allied-Stroud Corp., a division of Allied Materials Corp. This is the only equipment authorized for the application of Allied JET SEAL (Products 9015H and 9015M).

For complete information about Allied JET SEAL and the Allied-Stroud Applicators, write to:

IDEAL FOR CURB JOINTS—TIGHT SPOTS

With the COMPACT Applicator, curb joints (above), wing-walls—any tedious sealing problem—is solved. Extreme mobility, light weight, small size save time and manpower on all bridge sealing jobs.

COMPACT APPLICATOR FEATURES:

- Light weight: 650 lbs. 22 inches wide, 48 inches long. Will turn in the space of its own length. May be transported in a pick-up truck.
- Ideal for sealing vertical and overhead joints—light enough to be hoisted. Can apply 100 lbs. of JET SEAL per hour.
- Incorporates features of large JET SEAL Applicator (MODEL 8591-D).

JET SEAL (9015H) FEATURES:

- Material has no flow—even at elevated temperatures (200°F). Ideal for sealing vertical and overhead joints.
- Has positive adhesion, cohesion, resilience and ductility at low temperatures (−20°F).
- Will prevent penetration of water into joints. Is highly resistant to highway salts.
- Will prevent incorporation of incompressible materials. Quick curing at all temperatures.

ALLIED MATERIALS CORP.

PRODUCERS, REFINERS AND COMPOUNDERS OF SPECIAL ASPHALT PRODUCTS

ALLIED BUILDING • 5101 N. PENNSYLVANIA • P. O. BOX 7278 • 39TH STREET STATION • OKLAHOMA CITY, OKLA.

PLANTS: STROUD, OKLA. • DETROIT, MICH. • LOS ANGELES, CALIF.

. . . for more details circle 280 on enclosed return postal card

LUBE LOGIC Five tips to

Texaco "lay-away plan" protects exterior of idle equipment

Equipment that won't be needed for a while is sometimes simply parked somewhere so nobody will fall over it. Well and good, but not enough—because rust and corrosion account for almost half of what you spend on equipment maintenance. Here's a 6-step program that will keep idle equipment in cracker jack shape no matter how long it's out of use, or where it's stored. The basic ingredient is Texaco Rustproof Compound L—a remarkable product that keeps rust from starting, and acts to loosen rust that's already on the equipment.

1 Before applying Texaco Rustproof Compound L, make sure all exterior surfaces are clean and fairly dry.

2 Coat all adjustment bolts and other exposed threads with Rustproof Compound to facilitate removal or adjustment.

3 At temperatures of 65° or more, Texaco Rustproof Compound L can be applied to smooth accessible surfaces by brushing.

4 At temperatures below 65°F, or for inaccessible and complicated areas, spraying is the best way. You can thin the Rustproof Compound to a sprayable consistency by adding naphtha to form a 10 to 50% solution. Add the naphtha slowly to the compound and stir vigorously so the whole batch is the same consistency.

5 Apply tags at conspicuous points on the equipment describing the rustproofing measures that have been taken.

6 Thoroughly lubricate all equipment before storage.

Starting up equipment after storage

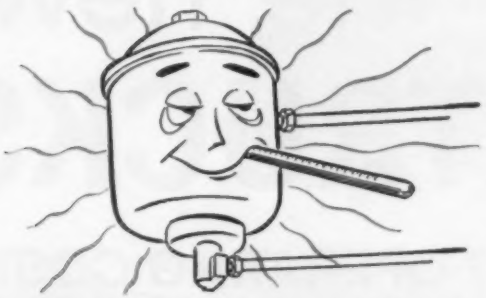
1 In most cases it's not necessary to remove Texaco Rustproof Compound L. You should, however, remove it from surfaces that will come into contact with personnel (such as ladders, seats and handles) and from surfaces that are heated to high temperatures when the equipment is operated.

2 Since Texaco Rustproof Compound L is *not* a lubricant, all working surfaces and lubrication fittings should be wiped clean before use, and the correct lubricant should be applied before starting up.

Thicker oil won't stop gear-case drooling

You can't fix leaking seals on a gear-case simply by switching to a heavier-grade gear lubricant, because in gear cases carrying heavy loads, the thicker oil simply increases gear-case temperature, which thins out the oil and it starts leaking again. Sometimes, however, foaming and leaking of gear-case lubricant indicates that the oil level is too high. By keeping vents open and keeping the oil at the recommended level, you prevent build-up of pressure which would cause leakage.

trim maintenance costs



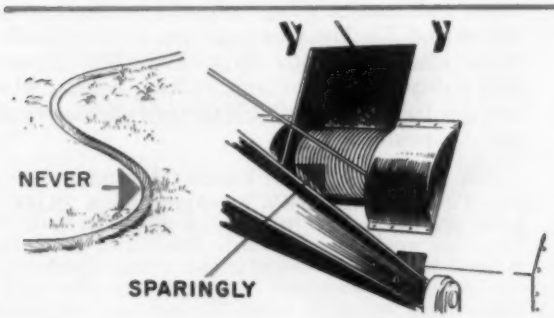
A filter that's working runs a temperature

Oil filters last so long these days it's sometimes hard to say when they were last changed. But they're so important to engine performance that it's essential that you know whether they're too full to filter right. Here's a simple way to find out.

A filter that's working will be as warm as the engine oil. If the filter on a fully warmed-up engine remains cool to the touch, it's a safe bet that it's too clogged up to let any oil through. Just to double-check, tap the filter case sharply. A metallic ringing sound means the cartridge is still in good shape. A soggy thud often means that the filter is loaded. Top mileage for even the best filter is 6,000 miles, never more.

Crawler treads are happier dry

There are few places where good lubrication is more important than in track-roll bearings, but make sure you don't lubricate the crawler treads themselves in a burst of enthusiasm. The pins that connect the links of crawler treads are designed to operate without lubrication, because dirt or other abrasives would act as a lapping compound in service. Result: much shorter service life for the track. Moral: if you don't want to lap your crawler link pins, don't oil them.



How often should you lubricate wire rope?

How much lubrication is good for wire rope and cable depends mainly on how it's used. Cables that are dragged in dirt shouldn't be lubricated at all. Oil simply holds the dirt where it can work into the strands and cause rapid wear. Cables that are wound on drums equipped with clutches should be lubricated sparingly to prevent fouling the clutch faces with lubricant. With other wire ropes, apply Texaco Crater A every 10 to 100 hours as necessary to avoid dryness. Be sure to clean the rope before adding new lubricant.

TEXACO LUBRICATION ENGINEERS

Every month or so we'll bring you a batch of "sleepers," little angles, so easy to overlook, where big savings in money and time can be made. But month in, month out, your local Texaco Lubrication Engineer is the best source of money-saving lubrication ideas. Don't forget that "Lubrication is a major factor in cost control."

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV

TEXACO

Throughout the United States

Canada • Latin America • West Africa

Save on construction costs with the new '61 FORD TRUCKS

NEW SUPER DUTIES CUT OPERATING COSTS, GIVE PROVEN DURABILITY THAT'S BACKED BY A 100,000 MILE ENGINE WARRANTY

New 100,000-mile warranty on Super Duty V-8 gas engines is the most liberal in the industry. On 401-, 477- and 534-cu. in. V-8's, Ford Dealers will replace any major engine part (including block, heads, crankshaft, bearings, valves, pistons, rings) found to be defective in materials and workmanship providing trucks are used in normal service. The warranty covers full cost of replacement parts for 100,000 miles or 24 months, whichever occurs first . . . full labor costs for first year or 50,000 miles, sliding percentage scale thereafter. Never before have you had such protection . . . such evidence of long-term durability!

And you save with greater gas economy! Certified tests prove the new Super Duty V-8's give up to 20% better mileage. In addition, Ford's new lightweight, *extra-hi-tensile* single-channel frames (standard F-850—F-1000) give you long-lived durability combined with a lightness of weight for added payloads. All in all, you get proven components and design features . . . in trucks built for easier maintenance and lower running costs.

Save with Ford T-Series Super Duty Tandems for exceptional durability, big payloads and low operating expenses. Ford T-850 and T-950 Tandems with Super Duty V-8 engines have rugged double-channel, hi-tensile frames for maximum strength, minimum weight. And they provide a wider range of chassis options so you can choose the right power train and load-carrying components for any job. Eaton and Timken rear axles are now available in bogie assemblies with up to 38,000-lb. capacity. And lightweight aluminum walking beams, wheels and gas tanks are available to keep chassis weights low . . . payloads high.

Ask your dealer about Ford's full tandem line . . . five T-Series with GVW's ranging from 28,000 lb. to 51,000 lb. and GCW's up to 75,000 lb.

SAVE UP TO $150 ON FRONT TIRES! In certified tests of truck suspensions, Ford front tires lasted up to twice as long. In 50,000 miles savings can add up to $150 on a pickup . . . more on two-tonners. And Ford's sturdy I-Beam front axle and leaf-spring suspension not only cut tire wear, but their simpler design also cuts maintenance costs.

12,000 MILE OR 12 MONTH WARRANTY

SAVE WITH GREATER DURABILITY . . . on all 1961 Ford Trucks, each part, except tires and tubes, is now warranted by your dealer against defects in material and workmanship for 12 months or 12,000 miles, whichever occurs first. The warranty does not apply, of course, to normal maintenance service and to the replacement in normal maintenance of parts such as filters, spark plugs and ignition points. Never before have you had such protection . . . such evidence of long-term economy!

SAVE WITH FORD'S NEW 262-CU. IN. "BIG SIX" ALL-TRUCK ENGINE FOR TOP PERFORMANCE AND ECONOMY

America's lowest-priced* medium-duty tilt-cab models now offer a big 262-cubic-inch Six with the power of big displacement, the gas economy of 6-cylinder design, plus the durability of heavy-duty construction. This engine features a sturdy stress-relieved head and block, strong forged steel crankshaft, long-lasting stellite-faced intake and exhaust valves and durable pyramid-type connecting rods. Positive Crankcase Ventilation reduces oil dilution and sludge formation to extend engine life. Ford's proven 292 V-8 and 292 HD V-8—the V-8's with "six-like" economy—are also available for your special power needs.

The popular Ford Tilt Cab Series outsells all other makes and for good reason! Their compact 82-inch BBC permits longer bodies within a given over-all length . . . for longer loads of lumber and building materials with excellent maneuverability. And set-back front axle design means more weight is carried on the front axle for greater payloads.

You also save with other new features like the stronger radiator with new lock-seam construction, and color-coded printed instrument panel electrical circuits that provide for greater reliability and simplified maintenance. In addition, Ford's parallel ladder-type frame, with standard 34-inch width, allows you to install new or transfer your present special construction bodies quicker and for less.

NEWS OF MORE SAVINGS FOR HEAVY CONSTRUCTION WORK . . . ▶

. . . for more details circle 297 on enclosed return postal card

Save on construction costs with the new '61 FORD TRUCKS

SAVE FROM $52 TO $221 ON PRICE* ALONE WITH FORD'S ECONOLINE PICKUP

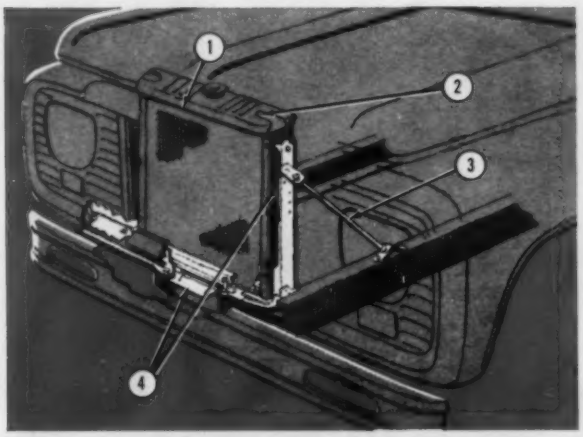
Profit-conscious contractors are finding it's good business to do business with the new Ford Econoline Pickup. It's America's lowest-priced* pickup—bar none! Priced from $52 to $221 below other cab-forward economy pickups. But that's just the beginning! You get lively performance and proven gas economy with the popular Falcon Six. This modern engine goes 4,000 miles between oil changes, and has an aluminized muffler which lasts up to three times as long as ordinary mufflers.

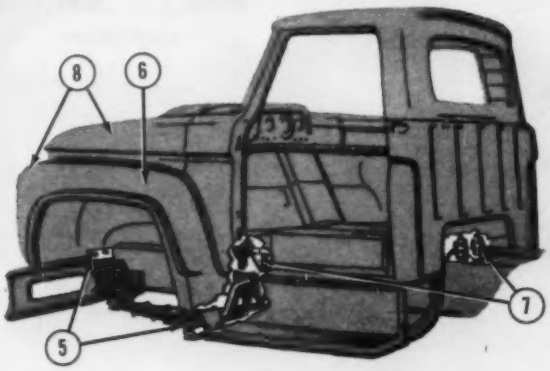
And you can save more because Ford's functional design has pared away 1,000 pounds of dead weight, yet you still get the payload capacity of standard ½-tonners. The big 7-foot box provides a whopping 73 cubic feet of loadspace . . . that's up to 23% more than conventional 6½-foot pickups. A full 49-inch tailgate opening means you can load items like standard sheets of 4′ by 8′ plywood. And the full-length *flat* floor permits bulky or heavy loads to be positioned easily by sliding them anywhere in the pickup box.

And you can save on maintenance expense, too. The engine cover can be lifted quickly, exposing the entire engine for rapid service. Spark plugs, distributor, etc., are conveniently located to speed engine tune-ups. And many major repairs can be made without ever removing the engine. One-piece cab-and-body construction provides increased rigidity and eliminates a major source of rust. In addition, all main underbody structural members are heavily zinc-coated to resist rust and corrosion.

**Based on a comparison of latest available manufacturers' suggested retail delivered prices*

SAVE WITH NEW HEAVY-DUTY CONSTRUCTION THAT DOUBLES CAB, SHEET METAL AND RADIATOR LIFE





① **Save with Ford's exclusive "lock-seam" radiator construction** that doubles the solder area at key seams for greatly increased strength and longer radiator life.

② **Save with heavier-gauge metal on radiator tank and header.** Tanks and header have thicker walls to resist vibration, jolts and corrosion for greater reliability.

③ **Save with independent radiator mountings,** separate from front-end sheet metal. This means that road shocks and shakes are not transmitted to the radiator through sheet metal . . . tanks, tubes and connections last longer, require less maintenance.

④ **Save with "horse collar" mounting** for extended radiator life. This new mounting on resilient rubber at the center of frame cross member soaks up any frame flexing . . . cuts wear and tear on entire cooling system.

⑤ **Save with independent fender mountings.** Fenders are bolted to a rubber-cushioned transverse bracket at the front and a frame-mounted bracket at the rear. This mounting, independent of both cab and radiator, eliminates stress transfers for increased fender life.

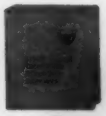
⑥ **Save with removable fenders.** The quick and easy removal of only 8 bolts per fender provides faster service accessibility to the engine area, saving valuable maintenance time.

⑦ **Save with new 3-point cab mounting system** for greater cab durability. Two outboard front mounts plus a centered "twin" rear mount provide a triangular system that holds the cab stationary while allowing the frame to move independently . . . reducing strain on the cab.

⑧ **Save with 42% heavier-gauge sheet metal** in fenders, hood, cab floor pan and toeboard for greater strength, greater durability.

Save with Ford's new Full-Torque flywheel power take-off . . . now available on T-750's and up, to power construction equipment like transit mixers. It's much simpler and more efficient than long, complicated hookups needed with the front-end drives. And the flywheel PTO is lighter in weight—only 105 pounds—for greater payloads.

FORD TRUCKS COST LESS



YOUR FORD DEALER'S "CERTIFIED ECONOMY BOOK" PROVES IT FOR SURE...

FORD DIVISION, Ford Motor Company

. . . for more details circle 298 on enclosed return postal card

6
G
6
G

WORK AWAY...

WORRY-FREE

...NO ROLLER GREASING EVER!

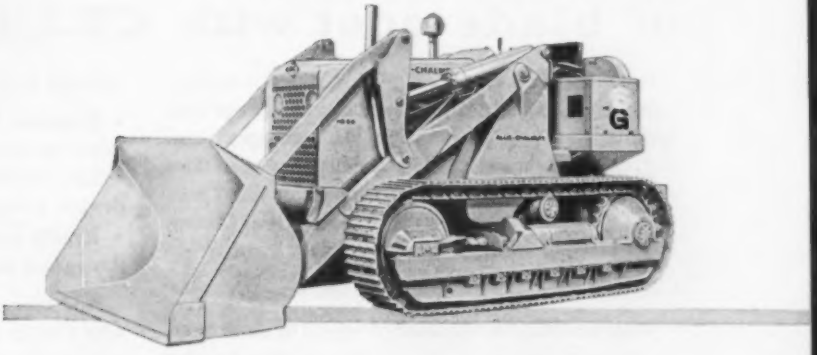
The 72-hp Allis-Chalmers HD-6G is the only 1½-yd tractor shovel with permanently lubricated tapered roller bearing truck wheels, idlers, support rollers—gives you certified protection . . . saves greasing time, materials and money.

The PERMA-SAFE truck wheels, idlers and support rollers in the HD-6G are lubricated at the factory . . . need no further greasing regardless of conditions. PERMA-SAFE design with Positive Seals and tapered roller bearings keep lubricants in . . . dirt and moisture out . . . *for life.*

In addition to timesaving, care-free track lube, the HD-6G also features super pry-out action, highest dumping clearance, fastest reverse and many more big tractor shovel advantages.

Your Allis-Chalmers construction machinery dealer will be glad to put an HD-6G through its paces on your toughest job. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

Now available in Persian Orange or Allis-Chalmers Yellow at no extra cost.



move ahead with

ALLIS-CHALMERS

...power for a growing world

. . . for more details circle 279 on enclosed return postal card

Get more operating hours per dollar of blade cost with CF&I Cutting Edges

In cutting edges, it's the *quality* that counts. A dependable, long-lasting blade on the mouldboard of your bulldozer is your protection against blade changes, work stoppages and time-consuming maintenance operations —all of which add up to costly downtime for you. That's why it's just good business sense to specify CF&I Cutting Edges for your earthmoving operations.

CF&I Grader Blades and Cutting Edges are—

• **Made to last . . .** scientifically designed to stand up to the toughest punishment. Hot rolled from special analysis, new billet, open hearth steel, they're free from hard and soft spots. Holes are cold drilled and punched.

• **Produced for easy, on-the-job installation,** to your exact specifications . . . in a wide variety of lengths, widths, thicknesses and hole spacings, in flat or curved designs, with squared or beveled edges.

• **Readily available . . .** from CF&I distributors located throughout the United States.

Add these factors up, and they total more value for your Grader Blade dollar. For detailed information on your requirements, get in touch with your CF&I distributor or sales office today.

CUTTING EDGES

THE COLORADO FUEL AND IRON CORPORATION

In the West: THE COLORADO FUEL AND IRON CORPORATION — Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Farmington (N. M.) • Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • San Leandro • Seattle • Spokane • Wichita

In the East: WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

7900.

. . . for more details circle 287 on enclosed return postal card

GRADE With "carry-type scraper" action, grade with inch-close labor-saving accuracy. The earth "boils" into this TD-9 Four-in-One!

STRIP Set the 4-in-1's clam in "carry-type scraper" position —strip sod or topsoil precisely! Get jobs other rigs can't do!

SPREAD On-the-go, put down a layer of topsoil, fill dirt, or "cover" with exclusive 4-in-1 "carry-type scraper" accuracy!

Only clam-action 4-in-1's multiply your money-making ability!

Why limit your income to what an old-style single-action loader, or any other limited-duty rig can earn you? Prove to yourself each big-capacity 4-in-1 action "doubles" for one or more special-duty machines—each action gives you an unlimited choice of working positions! See how only the clam-action 4-in-1 can multiply your ability to make money. Let your International Drott Distributor demonstrate!

5 Four-in-one sizes: ¾ to 3 cu. yd. capacity.

INTERNATIONAL HARVESTER

INTERNATIONAL® DROTT

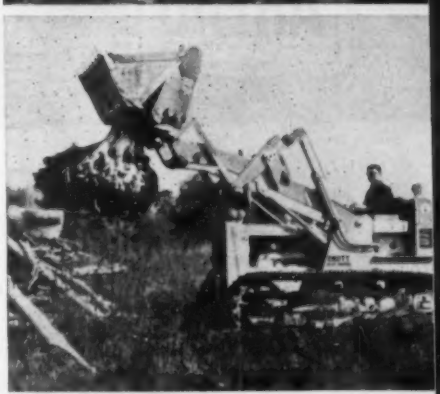
International Harvester Company, Chicago 1, Illinois

Drott Manufacturing Corp., Milwaukee 15, Wisconsin

PICK-UP "Surround" elusive loose materials without "chasing" them. Note this TD-6 Four-in-One. Just place open 4-in-1 over them, close the clam, and load!

BULLDOZE Open the 4-in-1's clam and you've got a full-capacity, earth-rolling dozer—depth-regulated by positive "radius control"!

GRAB Only the clam-action 4-in-1 lets you sit, grab, lift, and load "impossibles" like stumps, concrete, and rubble of all kinds!



BOTTOM-DUMP End the sticky materials problem, for good! Opening the clam of this TD-15 Four-in-One pulls material from bucket surfaces—gravity pull does the rest!

BACK-DRAG Pull down materials wholesale from the sand or gravel bank—and grade hard-to-get-at slopes with 4-in-1 back-drag action!

DO SHOVEL WORK Apply power-shovel-like 4-in-1 breakout power as this 3-cu. yd. TD-20 does—to dig up concrete slab, excavate hard materials.

415

Galion 160 works hardest where workpower counts most

This husky 160-hp. grader makes full use of more than 30,000 pounds of well-balanced weight to put more "push-power" at the blade — where power counts most in high-output grading.

Its massive one-piece welded frame is built to take the shocks and stresses of hardest working conditions day after day — keeping maintenance costs low.

Standard Galion features — including full floating axles, hydraulic booster steering, heavy-duty constant-mesh transmission and a 12′ x 29″ moldboard — permit Model 160 operators to do more work each day.

. . . for more details circle 307 on enclosed return postal card

GALION® ROLLERS AND GRADERS

For complete information contact your Galion distributor or write for Bulletin 421.

THE GALION IRON WORKS & MFG. COMPANY, GALION, OHIO, U. S. A.

General and Export Offices, Galion, Ohio, U.S.A.—Cable Address, GALIONIRON, Galion, Ohio

ROADS AND STREETS
Sixty-Eight years of Editorial Leadership

Washington News Letter

By Duane L. Cronk, Director, Highway Information Services

February 10, 1961

The Highway Research Board annual meeting, favorite gathering spot for highway engineers, drew its usual host of officials and experts to Washington last month. The increasing complexity of highway technology tends to force engineers into smaller and smaller circles of specialization. The Board meeting gives such men the opportunity to meet with others around the continent as deeply engaged as themselves in some aspect of highway design, administration, economics, or construction. Just as important, the Board meeting provides a platform for remarks which help each in his narrow band of research operations to realize his relationship to a broader whole.

This was certainly an objective under the leadership of Pyke Johnson, 1960 chairman, and the meeting last month reflected it. The major speaker presented to the highway technologists was a research man, but a researcher with considerable grasp of the relationship of automotive transportation to a vital, growing America. Lawrence W. Hafstad, vice president of General Motors for Research, told the highway engineers that one of the nation's most pressing transportation needs was for a policy, a philosophy of what is most desirable and a sense of direction to guide the efforts of officials and researchers alike.

* * *

This kind of talk had a familiar ring later this month, for there has been increasing pressure from political quarters for action to fill this policy vacuum. The accelerated highway program with its commitment of the federal government to building of costly new additions to the national highway systems, plus the deepening commuter problem in the nation's largest cities, plus the disturbing deterioration of railroad transportation, have created a wave of interest in the total transportation situation in this country.

Evidence of this probing has been cropping up intermittently throughout the last year, but this month saw it materialize in specific recommendations at some very high levels indeed. These developments are now winning headline attention. They are important to the roadbuilding industry, for they define the areas of conflict out of which the new Administration will forge some kind of political-economic philosophy. And this philosophy, in turn, will very decidedly determine the course of the National Highway Program in the years just ahead.

A host of recommendations by James M. Landis, White House advisor on organization, to President Kennedy was mainly concerned with reorganization of federal agencies dealing with federal-aid for transportation, but they did include a specific proposal that the President appoint a chief advisor on transportation matters.

(continued on next page)

More comprehensive was a study by John P. Doyle, former Air Force General and transportation specialist, for the Senate Commerce Committee. General Doyle asserted that transportation has become a national problem of such scope as to require Cabinet level treatment. A Department of Transportation, he maintained, should be established to formulate policy on the role of the federal government in highway development along with other methods of transportation. The Bureau of Public Roads, for example, would be shifted from Commerce to the new Department of Transportation. Other specific recommendations:

That federal-aid highway plans for metropolitan areas be coordinated with those for transit improvement.

That the cost of meeting defense requirements for the Interstate System be charged to that Department, rather than to highway users.

That all highway user revenues be dedicated to the Highway Trust Fund.

The Doyle Committee also explored the area of truck size and weight regulations. It concluded that present AASHO maximums should be retained until Congress can determine if heavy trucks are shouldering a fair share of the cost of new roads. In fact, the group said, the federal government should consider enforcing these regulations even in states where heavier loads are permitted.

By and large the most pertinent study to reach Congress last month, however, was the long-awaited "210 Study," a four-year-long research undertaking requested by Congress in 1956 to help it determine how the cost of highways should be allocated between users and non-users. (See Special Report next page.)

* * *

Meanwhile, an M.I.T. professor told President Kennedy, the nation is in a "recession" and appropriate government actions are well in order. Of particular interest to readers was Dr. Paul A. Samuelson's listing of the highway program as one which should be accelerated by the Administration. He suggested:

That contract controls be relaxed so state highway departments can award contracts, with the assurance that their obligations will be met.

That Uncle Sam provide matching money to those states in straits.

That the "pay-as-you-go" binder on the Interstate Program be unwrapped and that existing - or even higher - authorizations be transformed into construction projects promptly.

* * *

Off the cuff . . . BPR officials are happy about the new cost estimate for the Interstate System. They were able to throw in a billion dollars worth of administrative, research and contingency costs, thanks to a lower estimate of the construction, and still stay at the $41 billion figure that came out in 1958. Of the $32.9 billion job still unfinished, $701 million is in preliminary engineering, $4,614 million in right-of-way, and $27,377 million in construction. . . All the talk about a national super transportation agency is infectious. Last month, John Funk, Chief of the Maryland State Roads Commission suggested that such an agency would be in order on the state level. The highway engineer would have to concern himself with all forms of transportation, particularly in urban areas.

Special Report

The "210 Study" - Plenty of Data, But No Formula

A wave of recommendations swamped Washington last month from committees, study groups and organizations concerned with the role of the federal government in encouraging - or regulating - development of various systems of transportation - highway, railroad, air and waterway. Some suggestions were very specific, perhaps prematurely so, considering the lack of fundamental research, but a general consensus was revealed in all - namely that the federal government should not go on considering the merits of highway development, for example, alone and without regard to the effect of that program on other vital transportation systems and on the general economy.

If the federal government is pushed into a search for its role in overall transportation, it will find itself face to face with some basic first questions. One of these is "What is the effect of development in this system of transportation - not only upon the users and the efficiency of their operation - but upon the national economy, upon state economies, and if you please, upon the communities which new additions to that system might serve - in short, upon the general welfare?"

* * *

This was the very question which Congressional Highway Committees posed five years ago when the Bureau of Public Roads was asked to undertake a study of user and non-user benefits. The "210 Study" (Highway Cost Allocation) report reveals the results of that investigation. There is little doubt that it will provoke a rather complete re-appraisal of the financing foundation under the National Highway Program. Just as important, the "210 Study" - in its evaluation of public benefits from highway development - emerges as the first major effort to define the outlines of governmental responsibility for the general welfare, in this one field of transportation, at least.

This, in the light of current demands for a comprehensive study of all systems of transportation (and their effect on the general welfare), is the real significance of the "210 Study." Thanks to some rather pioneering research by the highway economists, there are some answers to the current clamor.

* * *

A major finding of the project was that nearly 95% of the cost of the Interstate System might justifiably be placed on the shoulders of highway users; the other 5% chargeable to general revenue sources. For the other primary roads, the ratio is 92.6% to 7.4%; and for secondary roads, 71.6% to 28.4%. The average of all - 92% to 8%.

This conclusion - that such a very high proportion of highway benefits are those experienced by highway users is impressive. It vindicates the general feeling of most people, even as private motorists, that highway users should logically bear the larger part of the cost of highway improvements. Some of the benefits motorists and truckers realize from highway improvement are:

(continued on next page)

Reduction of accident costs - The BPR study found that the average accident costs each motorists involved from $327 to $526.

Time savings - Every minute saved by a motorist over an improved highway is worth 2.37¢; by a trucker, from 4.75¢ to 7.13¢. The highway researchers found how much time is gained by having fewer signals, less rise and fall, more limited access features, resurfacing, wider lanes and re-alignments.

Reduction of operating costs - Through numerous cost comparison studies, the engineers discovered that the reduction of operating costs, through road improvements, is substantial.

Although the Bureau offered a mass of evidence to document the user benefits listed, it did not present conclusive data to indicate how much motorists and truckers should pay respectively for highway development. This issue must await results of the AASHO Road Test, postponed until summer.

* * *

In probing the area of benefits to non-users, the economists plowed through fertile ground. Some of these are real and measureable. For example:

New highways have a definite influence on industrial expansion, not only creating new sites and boosting land values, but also stimulating a re-assignment of land use to more productive purposes. The researchers cited numerous cases of where a new road raised land values from 200-700 percent.

New roads serving farm areas stimulated more productive use of this land, too, raised land values "dramatically," and expedited movement of farm produce from field to market.

New highways substantially increase the flow of tourist traffic to resort areas. Urban expressways do not adversely affect the resale value of homes nearby. Bypasses do benefit downtown business. And improved roads give much more mobility to wage earners seeking greater employment opportunities.

* * *

The roadbuilding industry had hoped that the "210 Study" would provide a formula which Congress could use in putting a firmer foundation under the long-range highway program. The assignment of 92 percent of the benefits to users, 8 percent to non-users might appear, at first glance, to be that formula.

BPR economists are clear, however, that this is not the case. It is relatively easy to isolate user benefits, but the non-user benefits cited as making up the 8 percent figure are like the tip of the iceberg that just breaks the surface. In short, the BPR asserted, the "total magnitude of such non-user benefits cannot be ascertained with presently available research materials." Who can place a value on the availability of a highway for leisure-time cultural, political, social, religious, educational and recreational activities? It is abundantly plain that the age-old question of who should pay how much will still be a source of controversy in Congress.

Meanwhile, the struggle over the fourth cent federal gasoline tax is already out in the open. The "temporary" tax is scheduled to lapse June 30, and the AAA has asked President Kennedy to let it drop. The Eisenhower budget not only called for an extension of the tax, but its increase by another 1/2 cent.

THE NEW LOOK

Here is the NEW LOOK in Construction Equipment. It is more automatic, more versatile, has more built-in precision than ever before. It is the new Blaw-Knox look. ■ It lets you do more jobs, more economically. ■ It sets new standards of reliability, the modern, automatic way. ■ See the automatic features, the rugged quality that lets you bid closer, work tighter, and make more money. ■ Take a NEW LOOK at Blaw-Knox!

BuKaneer Truckmixers — 4- to 10-cu. yd. drums with flywheel and front engine power take-off as well as separate engine drive. Four forward and reverse drum speeds. Simplified controls fore and aft. Air-electric drum direction control with drum Tachometer standard. Standard 125-gal. water tank overshoots cab for better weight distribution, is equipped with sight glass and measuring gauge. Options: pressurized flush systems, quick opening drum hatch, closed end drum, recirculating water systems, tank compartmentation.

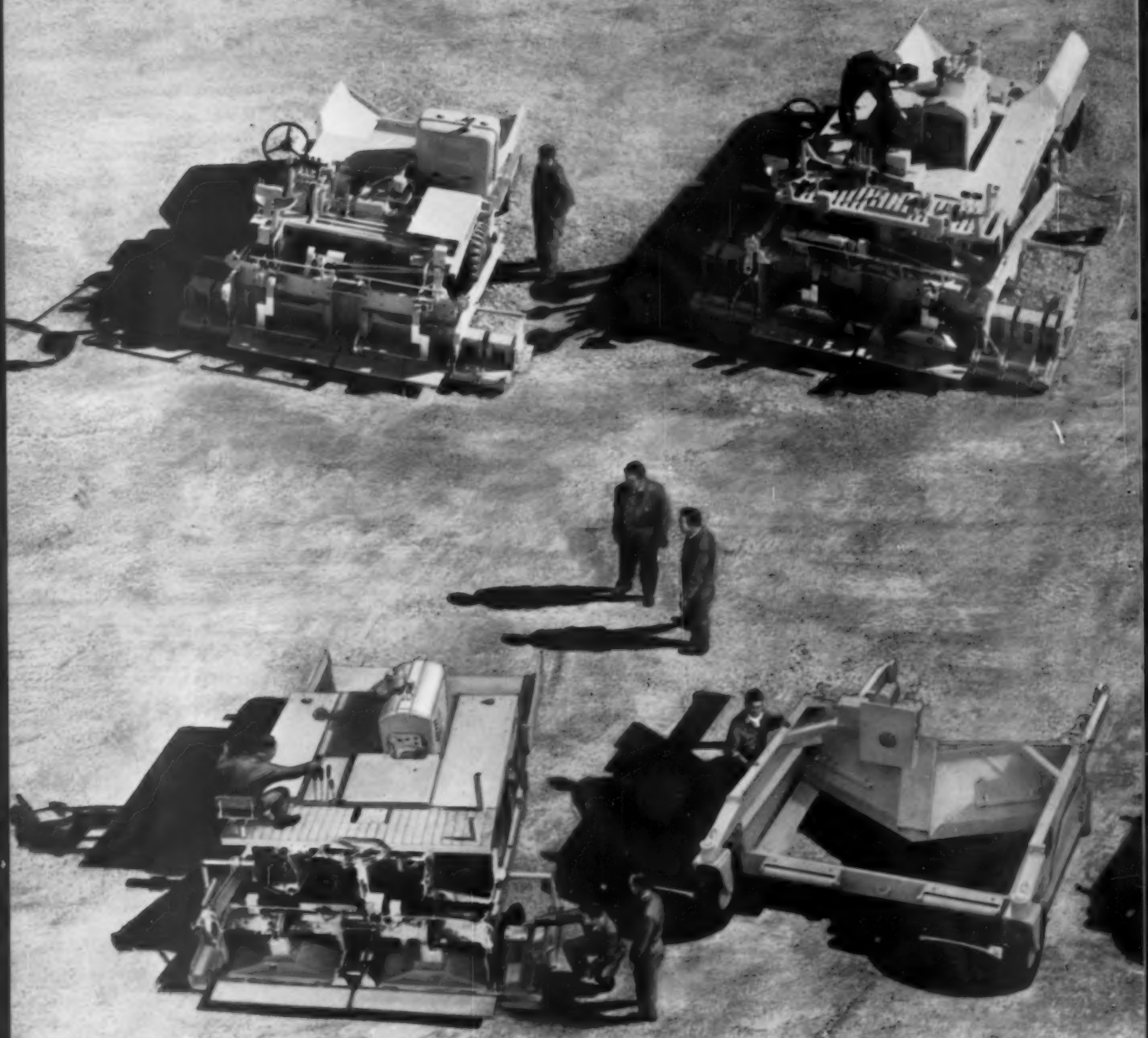
BLAW-KNOX

Universal Batch Control System (right)— Fully automatic cycling from preset mixes for simultaneous or cumulative batching using dial scales. Wide range of independent selector switches permits single material discharge without resetting. Locked formula panel for specification work. Can be equipped with digital or analog recording devices. System uses standard, readily available electrical components housed in dust-tight, drip-proof enclosure. Modular components make future expansion simple.

Uni-rect Design Batch Plants (far right)— Unitized, factory preassembled components make a wide variety of mix designs available in 2- to 8-cu. yd. automatic plants with 1 to 8 self-cleaning aggregate compartments, 1 or 2 150-barrel water-tight cement compartments. Two auxiliary cement compartments available. Equipped with 75-t.p.h. cement elevator. Complete plant shipped to you in factory assembled units for fast, easy erection.

Suburban Paver — Automatic control, 4-ton hopper, hydraulic folding wings. Right and left conveyors synchronized with augers. One piece screed with extensions to 12'. Full hydraulic wheel steering. Five paving speeds from 10 to 127 f.p.m. Travel speed 8.6 m.p.h. New hydraflated 10:00 x 20, 12-ply tires, and locking differential. Option: revolutionary new grade control for averaging out grade imperfections, adaptation to previously cut grade variations, and matching previously laid mat.

Express Paver—Automatic air-electric fingertip controls, 10-ton hopper with hydraulic folding wings. Independent control of left and right feed conveyors interlocked with control of augers. One piece screed design with extensions to 16'. Full hydraulic wheel steering. Eight paving speeds from 10 to 62 f.p.m. Travel speed 7 m.p.h. New hydraflated 10:00 x 20, 12-ply tires. Gasoline or Diesel power plant. Option: revolutionary new grade control for averaging out grade imperfections, determining grade from guide devices, adaptation to previously cut grade variations and matching previously laid mat.

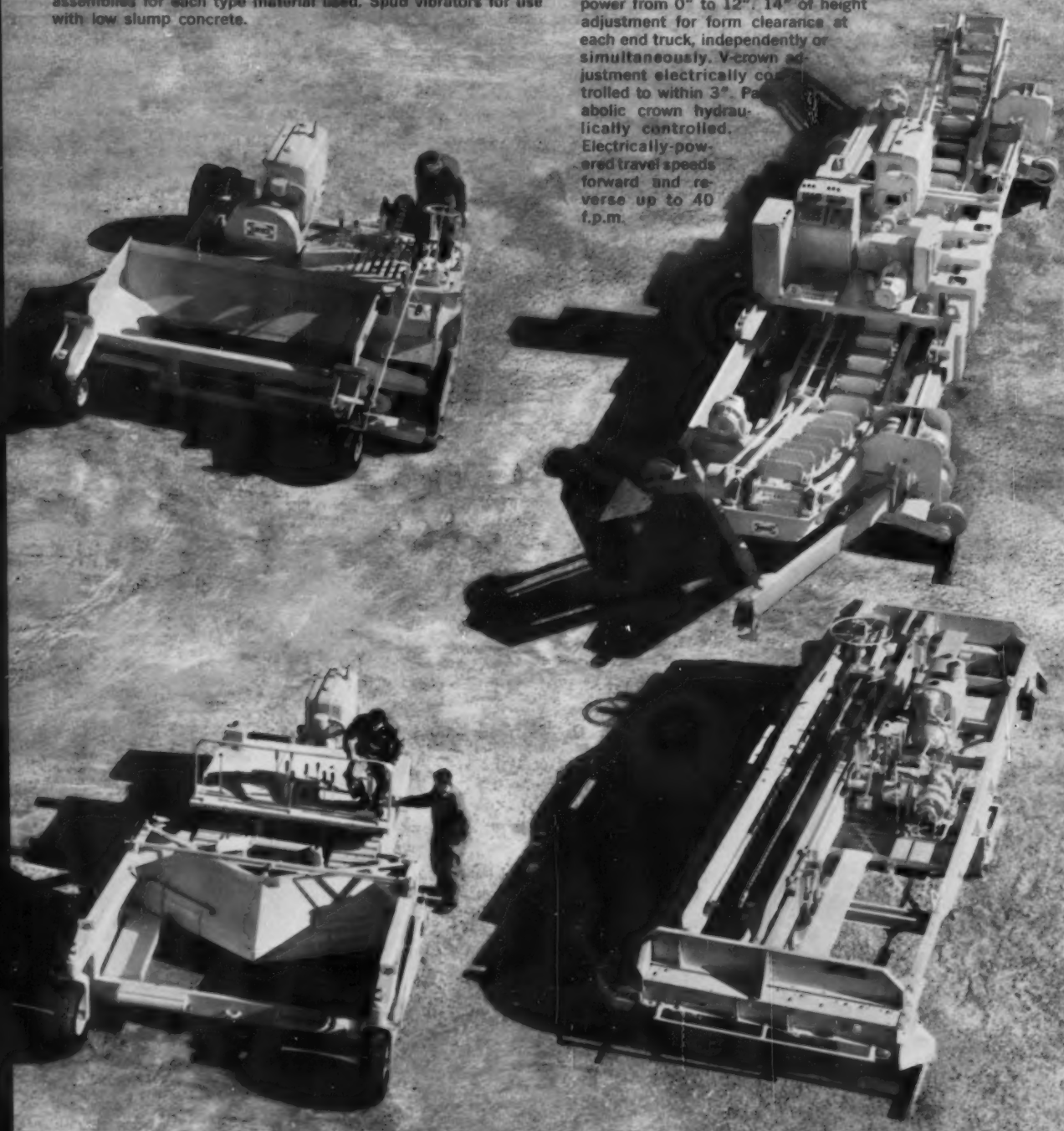


Super Paver—Automatic, air-electric fingertip controls, 12-ton hopper with hydraulic folding wings. Independent control of left and right conveyors interlocked with control of augers. Automatic control of material level ahead of augers. One piece screed in 10' width with extensions to 19'. Hydraulically driven tamper. Full hydraulic wheel steering. Eight paving speeds from 16 f.p.m. to 117 f.p.m. Four forward and reverse travel speeds from 6 to 11 m.p.h. Drive wheels equipped with 16:00 x 25 low-pressure earth mover tires. Full power brakes. Gasoline or Diesel power plant. Option: revolutionary new grade control for averaging out grade imperfections, determining grade from guide devices, adaptation to previously cut grade variations and matching previously laid mat.

Base Paver Attachment—Big capacity unit designed especially for use with standard tractors of sufficient power. New universal hitch makes attachment easy. Equipped with its own engine-driven oscillating screed, and mechanical crown adjustment. Spreads stone, slag, gravel, soil, cement and plant mix aggregates 1" to 20" deep in widths from 10'-10" to 16'-0". Hopper lifts completely for travel.

Road Widener—Versatile, one-man unit spreads any kind of aggregate, lays all types of bituminous mixes, spreads and finishes concrete. Spreads aggregate and bituminous materials in 2' to 10' widths, spreads and finishes concrete in 2' to 6' widths. 15' slip form attachment for concrete widening. Strike-off gate assemblies for each type material used. Spud vibrators for use with low slump concrete.

Sub-Grader—Revolutionary pushbutton power widening from 12' to 28'. Automatic control system sets frame, conveyor and cutter bowl adjustment up to 4'. Easy-to-add sections readjust conveyor and cutter unit to 8' to 12'. Entire range of depth adjustment made with synchronized electric power from 0" to 12". 14" of height adjustment for form clearance at each end truck, independently or simultaneously. V-crown adjustment electrically controlled to within 3". Parabolic crown hydraulically controlled. Electrically-powered travel speeds forward and reverse up to 40 f.p.m.



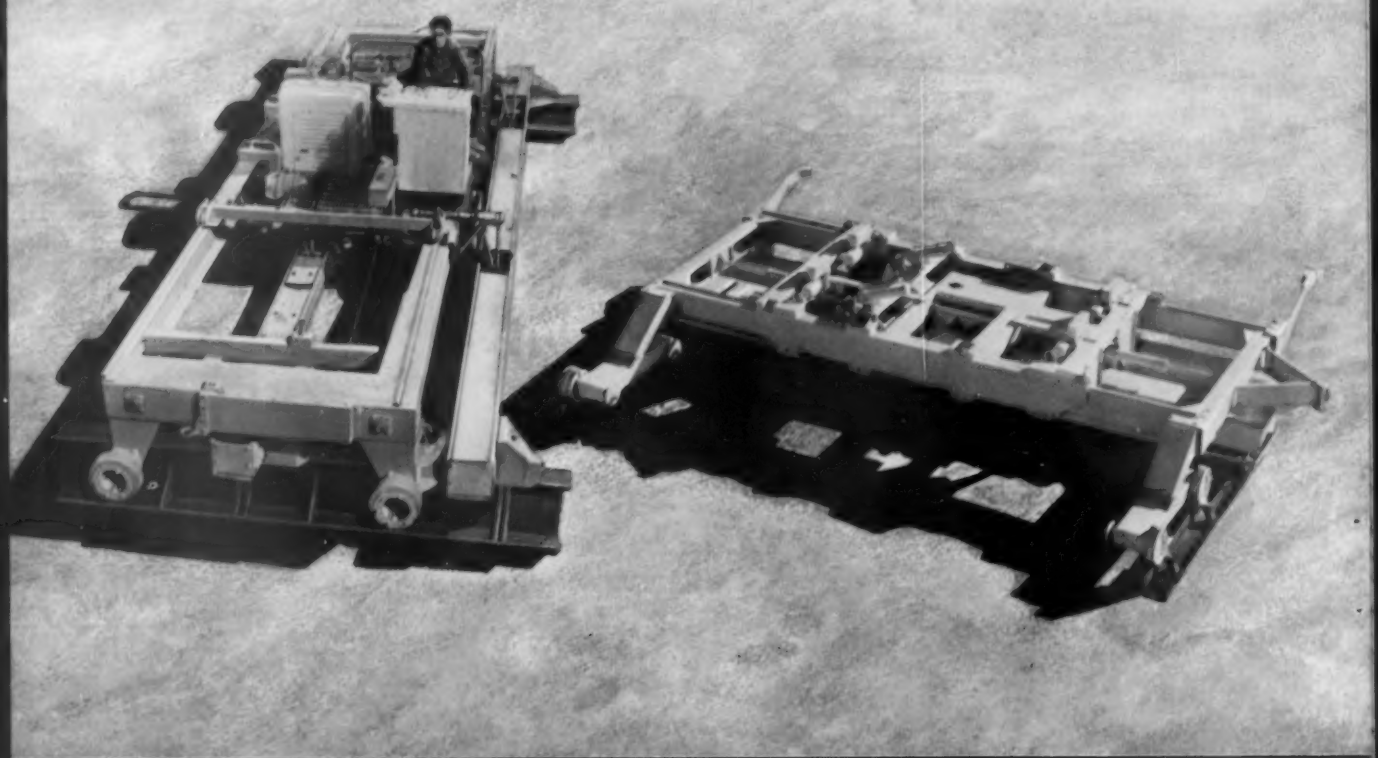
Self-Propelled Base Paver—Big capacity unit spreads stone, slag, gravel, soil cement or plant mix aggregates 1" to 20" deep in widths from 10'-10" to 16'-0", at the rate of more than 400 t.p.h. Tractor unit is equipped with 21" wide crawler shoes for maximum traction and flotation on softest base. Equipped with high-speed oscillating screed, front wheel power steering, dual controls. Four forward and four reverse working speeds, one forward and reverse travel speed.

Concrete Spreader—Automatic transverse blade delivers spreading action regardless of where concrete is placed on subgrade without segregation. Machine available in two standard widths—10' to 15' and 20' to 25'. Vibratory paving attachment available to compact concrete simultaneously with spreading action. Rubber-tire transportation wheels available for spreader and vibratory attachment.

BLAW-KNOX

Finisher—Revolutionary pushbutton power widening from 12' to 28' without frame alteration in an infinite range of increments. Frame positions automatically without bolts or clamps. Screeds available in both crown bolt and quick adjustable types. Screed speeds infinitely variable between 40 and 105 strokes per minute, are controlled independently from traction speeds. Traction speeds infinitely variable between 8 and 80 f.p.m. through heavy-duty, high torque, variable frequency AC motors and gear reducers in each end truck. Power supplied by variable speed alternator driven by 4-cylinder engine.

Finisher Float—Revolutionary, pushbutton power widening from 12' to 28'. Screed and pan-type float are quick adjustable for crown and operating position with synchronized electric power. Suspended oscillating screed is powered from Finisher through electric clutch and universal drive. Float is attached to Finisher and controlled through its own pushbutton controls mounted near the control panel of the Finisher.

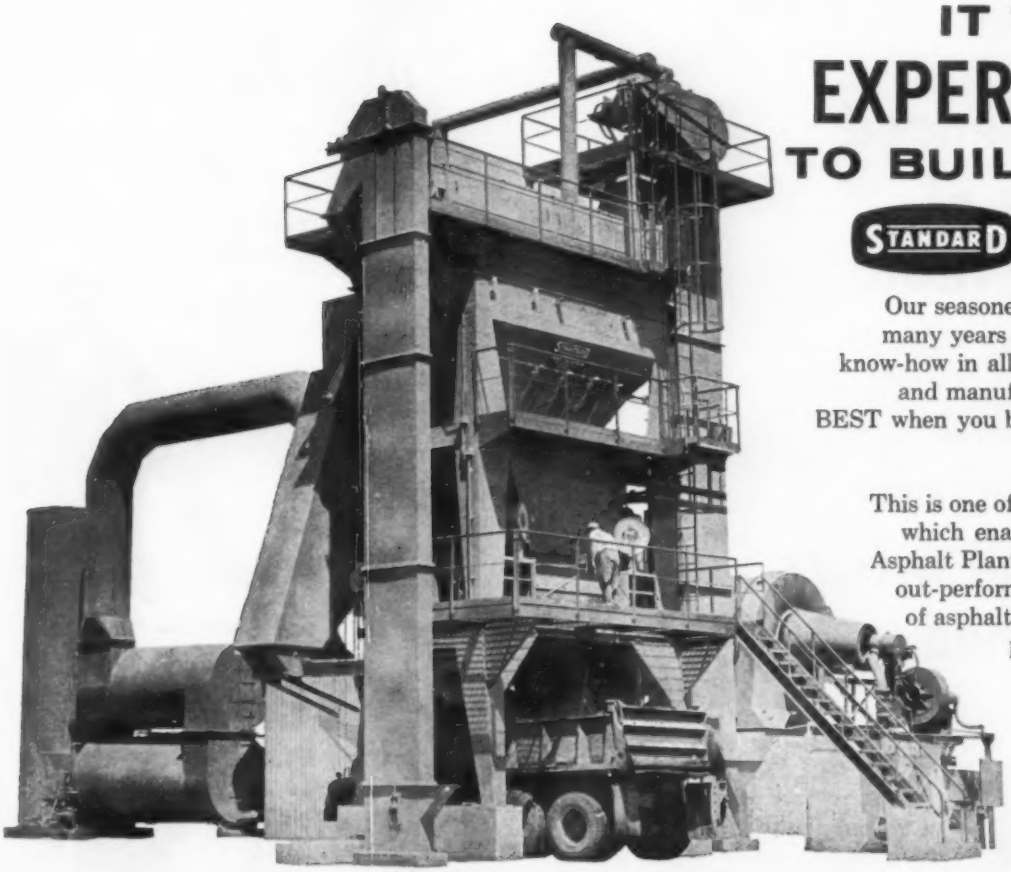


BLAW-KNOX

ON THE WAY: MORE OF THE NEW LOOK

Soon you'll see more Blaw-Knox Equipment with the modern, automatic features of the new look. For instance: a new self-widening, slip-form Concrete Paver, a batch handler for dual drum Concrete Pavers, a central mix Concrete Spreader, Mobile and Portable Batch Plants, all Aluminum, Hydrostatic-drive and trunnion-mounted Truckmixers, compaction rollers, centrifugal Concrete Mixers, and a new Hydroscoop. Keep in touch with your Blaw-Knox dealer for the latest information on the NEW LOOK.

IT TAKES EXPERIENCE TO BUILD THE STANDARD ASPHALT PLANT



Our seasoned craftsmen with many years of experience and know-how in all phases of design and manufacture assure the BEST when you buy STANDARD Asphalt Plants.

This is one of the many factors which enable STANDARD Asphalt Plants, size for size, to out-perform all other makes of asphalt plants, i.e.: more production at less operating and maintenance costs.

33 YEARS WITH STANDARD

STEVE POPP, maintains proud record in building and assembling STANDARD DRYERS.

21 YEARS WITH STANDARD

GILBERT TORRES, expert on precision fitting, carefully adjusts mixer bearing.

18 YEARS WITH STANDARD

BOB PEREZ, veteran employee on STANDARD Asphalt Plants — specializes in assembly of mixing units.

14 YEARS WITH STANDARD

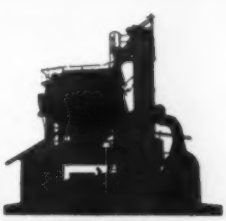
NEIL MULVIHILL, shop foreman personally supervises the building of every STANDARD Asphalt Plant.

STANDARD ASPHALT PLANTS

STANDARD / Complete line of Asphalt Plants 2000 through 8000 pound capacity.

Model T-M • Trailer-mounted, self-contained.

Model R-M • Semi-portable and stationary



Model S-E • Self-erecting, fully portable.

STANDARD STEEL CORPORATION *Manufacturers of: Asphalt Plants • Rotary Dryers • Kilns • Coolers • Cryogenics*

GEN. OFFICES AND PLANT: 5003 BOYLE AVE., LOS ANGELES 58, CALIF. • MIDWEST OFFICES AND PLANT: DECATUR 03, ILL. • EASTERN OFFICES AND PLANT: LOWELL 03, MASS.

. . . for more details circle 337 on enclosed return postal card

These experienced buyers of 2-way radio specify Motorola more often than all others combined...

• FIRE

• TAXI

• MANUFACTURING

• PUBLIC UTILITY

• CONSTRUCTION

• RAILROAD

• POLICE

• TRUCKING

Here's why your business can profit from the experiences of these long-time users.

1. *MOTOROLA has the most reliable equipment for long-run economy.* Records of experienced buyers *prove* Motorola 2-way radio works better, longer—therefore, it costs less.

2. *MOTOROLA engineers the radio system for your specific job.* Motorola sells exclusively through factory-employed 2-way radio sales engineers. You can always look directly to Motorola to completely satisfy your 2-way radio requirements.

3. *MOTOROLA equipment matches the job.* Motorola has the world's most extensive line—thousands of installations. There is a model to exactly meet *your* system needs.

4. *MOTOROLA provides nearby, expert service.* Motorola—through its nearby Service Center—will provide regular, programmed maintenance and assume full and undivided responsibility for the continuing peak operation of your system.

. . . Four excellent reasons why you should ask Motorola to plan *your* 2-way radio system.

Motorola . . . the communications specialist to industry for nearly three decades

MOTOROLA 2-WAY RADIO

Motorola Communications & Electronics, Inc., 4501 Augusta Blvd., Chicago 51, Ill.

A Subsidiary of Motorola Inc.

SPaulding 2-6500

People

T. E. Connolly

Geo. T. McCoy

David E. Root

John L. Savage

Beavers Honor Four Construction Leaders

Four of the West's outstanding leaders in engineering construction were honored in Los Angeles in January, on the occasion of the 1961 Beavers' Award Banquet. Paul Grafe, Beavers' president, bestowed the coveted honor upon T. E. Connolly, head of the San Francisco contracting firm bearing his name, for distinguished management; David E. Root of Palm Springs, retired vice president of Guy F. Atkinson Company's vast construction organization, for achievement in supervision; George T. McCoy, retired California state highway engineer, for engineering achievement; and John L. Savage of Denver, retired consulting engineer, for special honors.

The Beavers is an association of dam builders, heavy contractors and suppliers who have participated in every major heavy construction undertaking in the West during the 20th century. Present

Continued on page 30

COMPETITORS HATE IT...

No Professional team would pass up an opportunity to sign a player who bats 1000. And no caisson contractor should be without a WILLIAMS digger! WHY?

BECAUSE a professional team demands outstanding performance of its players and WILLIAMS diggers are second to none in productive capacity.

BECAUSE a true pro must be consistent and the name WILLIAMS has become a synonym for dependability.

BECAUSE The versatility of a switch hitter is exemplified in the WILLIAMS digger capability to drill large and small diameter holes, vertical or battered, with augers or hard-rock bits, buckets or underreamers.

Why not "sign" a WILLIAMS digger for your team? The competitors may not like it . . . but the stockholders will.

HUGH WILLIAMS

Manufactured by
HUGH B. WILLIAMS MFG. CO.
8330 Lovett Ave.
P. O. Box 7815 • Dallas, Texas

Write Exclusive Distributor
JOSLYN MFG. & SUPPLY CO.
2101 Corinth St. • Dallas, Texas
for DESCRIPTIVE LITERATURE

. . . for more details circle 345 on enclosed return postal card

CHEVROLET IFS FRONT INDEPENDENT SUSPENSION "WALKS" WHEELS OVER TRUCK-BUSTING BUMPS!

Chevrolet truck wheel action on rough road surface, as depicted by 4-stage stop-action photography

CHEVROLET I.F.S. (FRONT INDEPENDENT SUSPENSION) PROTECTS YOUR PROFITS THESE THREE WAYS:

1 *Rides down high maintenance costs.* When a bump looms up, Chevy's independently suspended front wheels "walk" right over it. Most road shocks and jolts never reach the chassis, cab or body. The truck rides *smoothly*, takes less of a beating, stays in cost-saving shape longer. Your income doesn't dribble away in big repair bills. And you don't lose money through excessive downtime, either.

2 *Rides cargoes over rough spots with less damage . . . minimum loss.* Thanks to those same "walking wheels," loads don't do much bouncing in the body of a '61 Chevy truck. That means you don't have to contend with undue cargo damage that eats away at your earnings. (Chevy's load-tailored *rear* suspension helps protect cargoes, too.) This sure protection for fragile loads—and profits—is standard in 1961 Chevrolet trucks of every weight class.

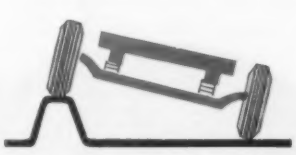
3 *Rides drivers through with less fatigue—for tighter schedules.* Wait till you see how Chevy front wheel action works to eliminate tiring shimmy and steering-wheel fight. It means that the man at the controls can stay there longer with less fatigue—stay on schedule and do a bigger day's work. (Another reason you can look for faster schedules is that Chevy's bump-beating wheel action allows faster safe speeds on rough roads.)

That gives you an idea of how Chevy Independent Front Suspension works to move you ahead in the money-making department. And it's available in 165 Chevrolet models for '61, from new Corvair 95's to 36,000-lb. GVW tandems. Check it out with a demonstration ride at your Chevrolet dealer's, sometime soon. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

INDEPENDENT FRONT SUSPENSION

In Chevy, each front wheel, suspended independently, is free to step cleanly over bumps (see left). Each works smoothly to reduce objectionable jolts so characteristic with I-beam axle design (right). Working with load-tailored rear suspensions in every weight class, I.F.S. provides the basis for profit-protecting performance that's unmatched by I-beam axle trucks.

I-BEAM AXLE DESIGN



1961 CHEVROLET STURDI-BILT TRUCKS

CHEVROLET

. . . for more details circle 301 on enclosed return postal card

People

Continued from page 27

at the dinner were 1,200 construction leaders from throughout the country.

Principal banquet speaker was Edgar F. Kaiser, president of Kaiser Industries Corporation and currently senior vice president of the Beavers. Other Beaver officers include: J. P. Shirley, Jr., vice president; Thomas H. Paul, secretary-treasurer; J. W. Watson, assistant secretary-treasurer; and James L. Lovell, ambassador of goodwill.

Martin to Head Kansas Asphalt Assn.

Maurice Martin, director of highways, Kansas highway commission for the last three years has resigned to accept a position as secretary-manager of the Kansas Asphalt Association. He succeeds Jerome P. Kearby, who resigned the post of engineer-director of the organization recently to accept a position with the U.S. Bureau of Public Roads in Texas.

H. Bobbitt Aikin has been promoted to a new position as Senior Regional Engineer for the Calcium Chloride Institute, in charge of the Eastern-Southern region. Harry A. Smith with a similar title will serve the Central-Midwest region of the Calcium Chloride Institute.

Both are graduate civil engineers who will supervise field engineering, research and other technical activities related to the use of calcium chloride in their respective areas.

L. M. "Mike" Hayes, of Rock Roads Construction, Inc., has been re-elected president of the Wisconsin Bituminous Paving Association for the fifth successive year. L. W. Kahl, of Rein, Schultz and Dahl, Madison, is re-elected secretary-treasurer. Edward J. Konkol, continues as executive vice president.

Dwight M. McCracken, vice president, Liberty Mutual Insurance Company, Boston, Mass., has been elected chairman of the board of governors of the Insurance Institute for Highway Safety. He succeeds Thomas C. Morrill, vice president, State Farm Mutual Automobile Insurance Company, Bloomington, Ill.

Thomas A. Marshall, Jr., has been made executive secretary of the American Society for Testing Materials, succeeding Fred F. Van Atta who has become treasurer of the Society.

FRINK Roll-Over Sno-Plows For Airports and Expressways

The jet age requires a speed-up of all operations. End time-consuming *deadheading* with a Frink Roll-Over Sno-Plow. In *15 seconds* the plow can be reversed, hydraulically. Easily detached from the truck, works efficiently with both right- and left-hand leveling wings.

FRINK ROLL-OVER SNO-PLOWS are available in 8, 9 and 10 feet cutting edge widths.

For free illustrated catalog, write Dept. RS-261

FRINK SNO-PLOWS REG. U. S. PAT. OFF.

FRINK SNO-PLOWS, INC., Clayton, N. Y.

In Canada: Eastern Steel Products, Ltd. Preston, Ontario

. . . for more details circle 294 on enclosed return postal card

Old Shermans Sell New Shermans

The old...

"This Sherman is almost 8 years old... and still going strong!"

Says Charles R. Thompson, Thompson Bros. Plumbing Co., Decatur, Georgia

"We bought our first Sherman in 1953. When business grew, we bought another. From the first day we had them, both Shermans have been in constant use—at any given time we have about 20 jobs in progress—requiring only minimum maintenance to keep them running in equal-to-new condition. By now, our two Shermans have delivered a total of more than 11 years continuous service, amounting to more than 33,000 operating hours, in some of the toughest imaginable situations. They seem to be indestructible... **we figure to keep on using Sherman products.**"

Why not find out what Sherman can do for you? See your Ford dealer... Check the yellow pages or write to Allied Equipment, Ford Motor Company, 2500 E. Maple Rd., Birmingham, Michigan.

SHERMAN

POWER DIGGERS • LOADERS • AUXILIARY TRANSMISSIONS

And the New...

SHERMAN BOBCAT DIGGER

Compact, maneuverable 8′ or 10′ digger for light budgets, tight spots—cemeteries, inside work—or where light weight is necessary.

SHERMAN PANTHER DIGGER

Big and fast, with typical Sherman dependability . . . 12′ digging depth, 188° swing, exclusive filter gauge, much more for high production, low maintenance.

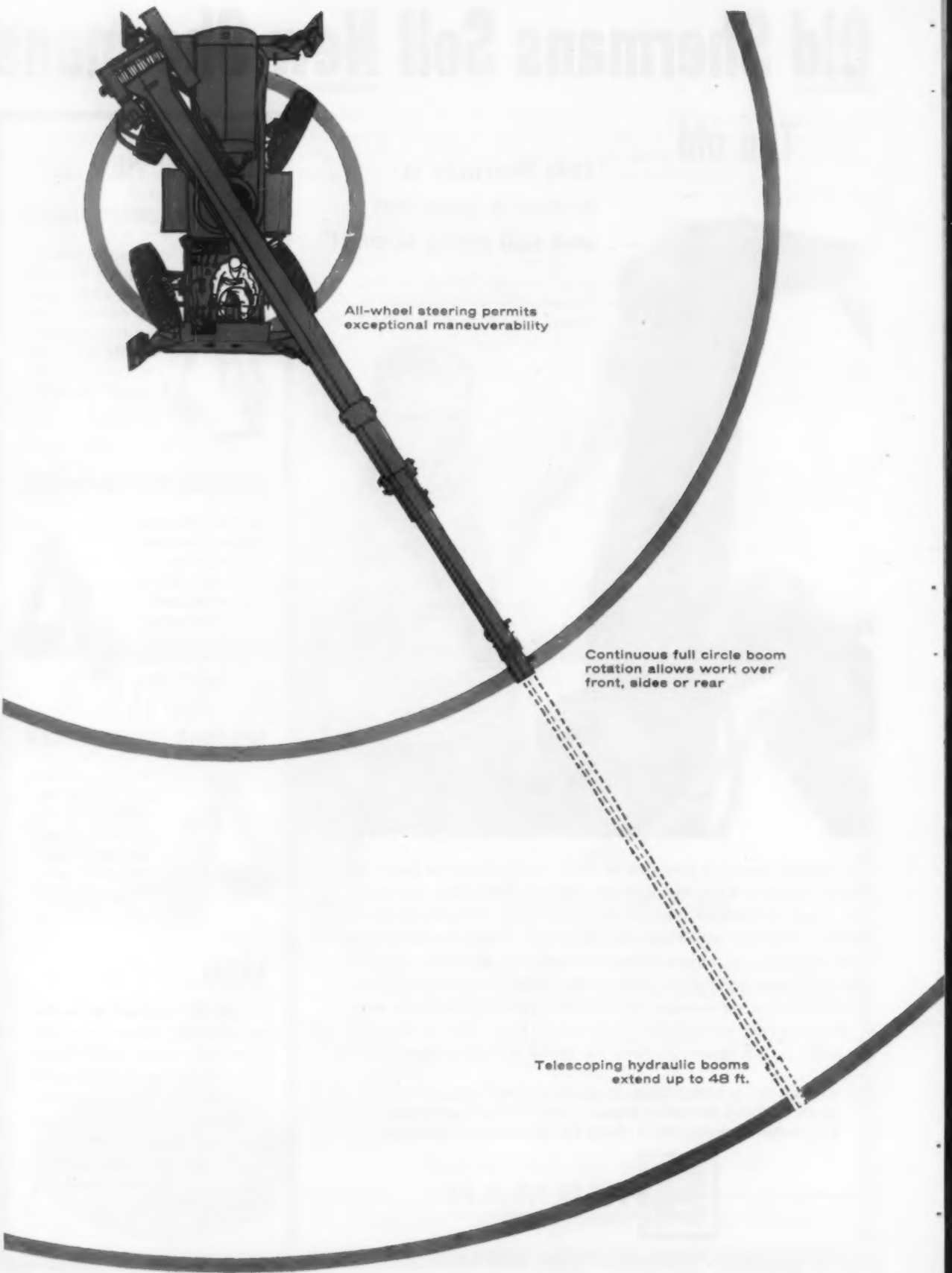
SHERMAN MAJOR DIGGER

Here's a perfect pair—match Sherman's durability, dig-ability with Fordson's rugged diesel economy. 12′ digging depth.

ALSO...

12 speeds instead of 4—For more power, more economy, equip your 4-speed Ford tractor with the Sherman 12-speed combination step up—step down transmission to **exactly** match power and speed to every job. Or, for fast shuttling, install a time-saving Sherman **reversing transmission.**

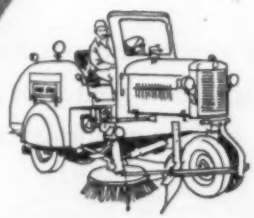
. . . for more details circle 300 on enclosed return postal card


All-wheel steering permits exceptional maneuverability
Continuous full circle boom rotation allows work over front, sides or rear
Telescoping hydraulic booms extend up to 48 ft.

AUSTIN-WESTERN PRODUCTS SAVE TIME AND MONEY

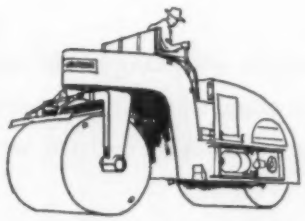
LIFT, CARRY AND PLACE IN AREAS WHERE OTHER CRANES CANNOT WORK

Tight, cramped working quarters and low overhead clearances pose no problem for Austin-Western hydraulic cranes. Because they've got the easy maneuverability of all-wheel steering *plus* long reach and big load capacity. Telescoping booms swing in continuous full circle on most models; extend to maximum 48-ft. length on Model 410. Safe, precise, easy to operate. Rubber-mounted, they work indoors or out equally well —most travel at speeds to 35 mph. A-W owners tell us they're perhaps *the* most useful multi-purpose pieces of equipment you can buy. They do just about everything . . . from plant maintenance or construction equipment repair to materials handling tasks. And they can be even more useful equipped with clamshell, dozer blade, snow plow, magnet, personnel platform, or other attachments. They come in 5 models—capacity ranges up to 11 tons; self-propelled, truck or stationary mountings. Learn just how profitable an A-W would be in your operation. Get facts from our distributor or write us direct.



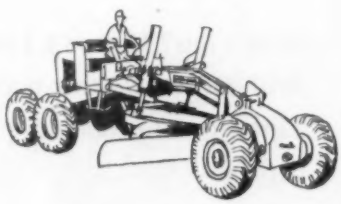
A-W MOTOR SWEEPERS

2 models: 2-yd. Model 40; 4-plus yd. Model 60. Safe, easy front steer; full visibility. Simplified design; broom and hopper in rear.



A-W COMPACTION EQUIPMENT

Variable weight tandem and 3-wheel rollers to 14 tons; 3½-6 ton portable tandem; Roller-Compactor; vibratory attachment for most 3-wheel rollers.

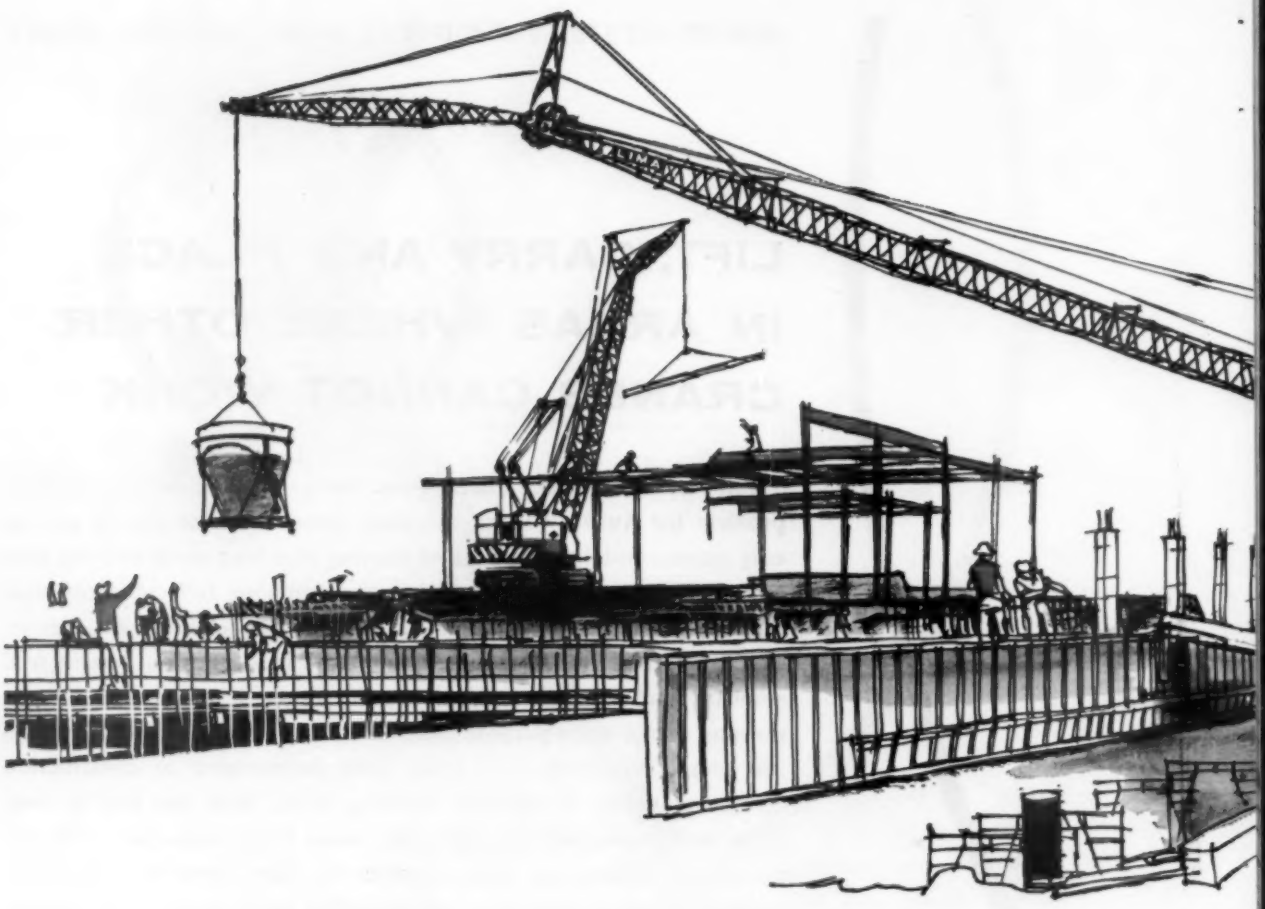


A-W POWER GRADERS

9 models; all-wheel drive and steer 4-wheel Pacers and 6-wheel Supers. Weight classifications to 30,000 lb., power ranges to 165 hp

Austin-Western CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.
BALDWIN · LIMA · HAMILTON

. . . for more details circle 277 on enclosed return postal card



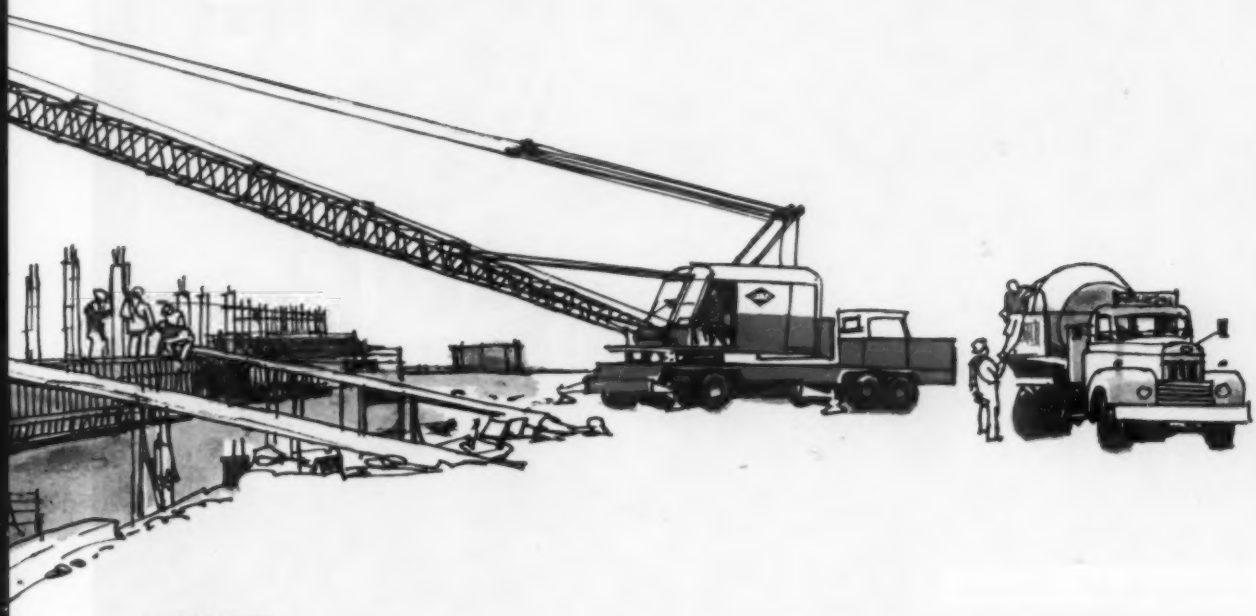
TALK ABOUT A BOARDING HOUSE REACH...

How's this? Here is a Lima equipped with long boom reaching out almost horizontally. With most any other make truck crane this is a tricky low-boom operation—but with a Lima it's an example of strength without excessive weight and of high-performance capabilities.

Like all Limas, the truck cranes are more useful and profitable because they can be counted on to stay on the job without excessive downtime and costly repairs. They're the best you can buy. Lima accepts undivided responsibility for both crane *and* carrier. Booms can be raised from horizontal without assistance; unit easily strips to legal load limits for rapid transport. Choices of carrier drives and power plants. Interchangeable front ends.

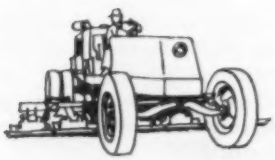
Why not ask your nearest Lima distributor today for facts, figures and a demonstration of the Lima type and size best for you—or write to us here in Lima.

THE USEFULNESS OF A LIMA

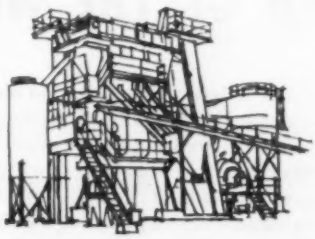


CAPACITIES

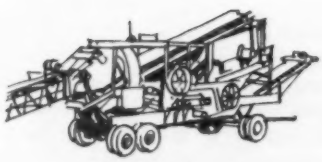
TRUCK CRANES—20 to 80 tons, boom-jib combinations to 250 ft.
WAGON CRANES—20 to 75 tons
CRAWLER CRANES—15 to 140 tons
CRAWLER MOUNTED SHOVELS—¾ to 8 cu. yd.
CRAWLER MOUNTED PULLSHOVELS—to 4½ cu. yd.



LIMA MODEL D ROADPACKER—Six vibrating shoes consolidate fast, deep for profitable single-course construction; available in 12-shoe Super model.



LIMA MADSEN ASPHALT PLANTS—available in models with batching capacities from 1000 to 10,000 lb.



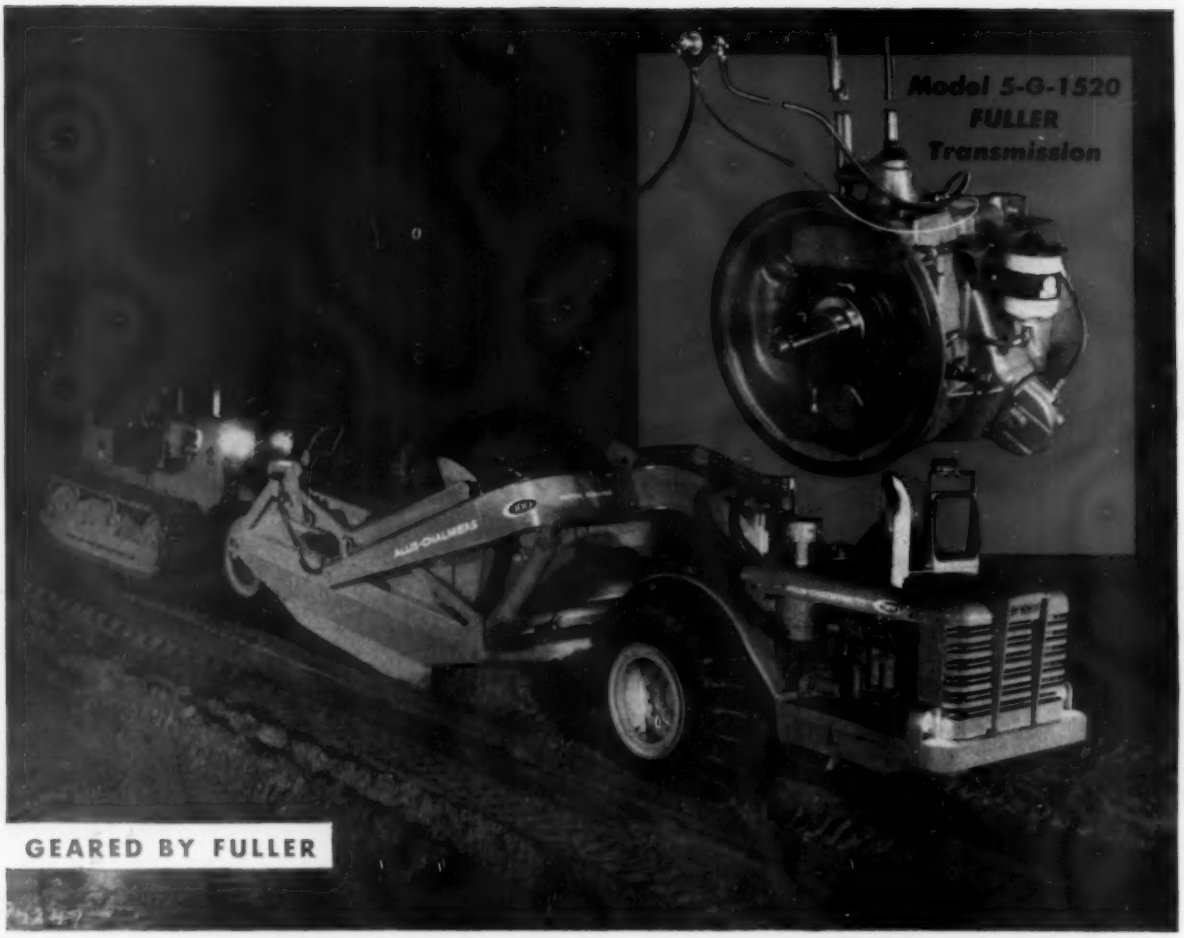
LIMA AUSTIN-WESTERN portable and stationary crushing, screening and washing equipment; including jaw crushers, feeders, screens, elevators, conveyors, bins.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA Construction Equipment Division • Lima, Ohio

BALDWIN · LIMA · HAMILTON

. . . for more details circle 283 on enclosed return postal card



Scraper performance is important through

EVERY INCH OF THE WORK CYCLE

Allis-Chalmers' new TS-360 Motor Scraper—30 yards heaped—was designed with four major performance factors in mind: acceleration under load, sustained haul speeds, exceptional maneuverability and full-power spreading on the fill.

To achieve this performance, the 340 hp scraper is equipped with a Fuller 5-G-1520 5-speed Transmission. The heavy-duty, constant-mesh, spur-gear transmission features the Fuller Air-Actuated Countershaft Inertia Brake, which permits quick, easy up-shifts without double-clutching. Activated simply by pushing a button, the countershaft brake helps maintain momentum during shifts for maximum acceleration and sustained speed throughout the entire work cycle.

The 5-G-1520 is also equipped with the Fuller Pressure Lubrication and Filtration System which keeps gear oil clean, provides longer gear and bearing life and higher equipment availability.

Ask your equipment dealer about the Fuller Transmission designed to get more work from *your* equipment, put more profit in *your* operation.

FULLER TRANSMISSION DIVISION

EATON MANUFACTURING COMPANY

KALAMAZOO, MICHIGAN

Sales & Service: West. Dist. Branch, Oakland 6, Cal. • Southwest Dist. Office, Tulsa 3, Okla. • Automotive Products Co., Ltd., Breck House, Langham St., London W.1, England, European Rep.

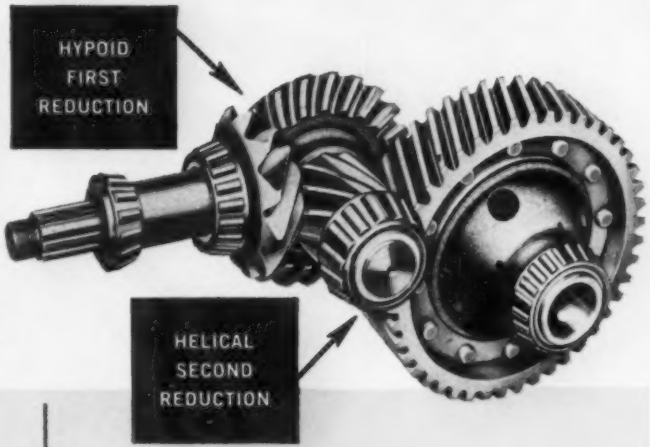
. . . for more details circle 349 on enclosed return postal card

Heavy-Duty Hauling Jobs Are Easy With Timken-Detroit®

BALANCED

HYPOID-HELICAL DOUBLE-REDUCTION AXLES

Timken-Detroit balanced hypoid-helical double-reduction gearing is unequalled for top performance and dependability. Outstanding advantages that make it the choice of heavy-duty equipment manufacturers and operators are: big, husky gears . . . greater flexibility in gear ratios . . . balanced gear set loadings . . . long life and low maintenance costs. The hypoid first reduction is 30% stronger than spiral bevel, and works in series with the second reduction to take an equal share of the load. In the helical second reduction, strong helical gears with a wide range of ratios insure balanced double-reduction gearing.

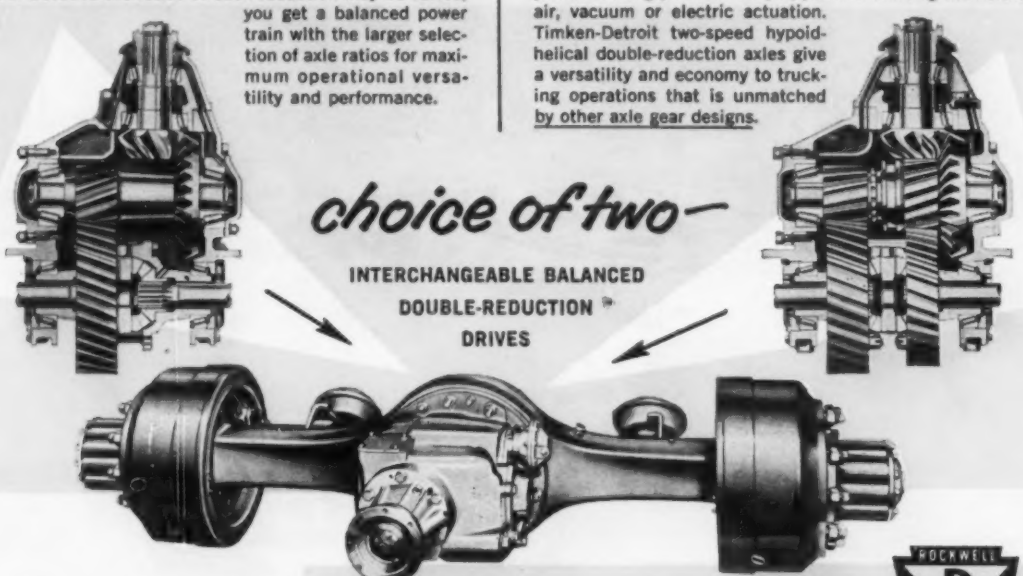


240 SERIES
SINGLE-SPEED, HYPOID-HELICAL DOUBLE-REDUCTION

Two full-sized gear sets form a balanced power train—with each gear set accomplishing a substantial reduction. This combination of husky hypoid first reduction gears coupled with rugged, wide-faced helical second reduction gears provides a double-reduction gear set that outperforms all others. Because the ratios of each reduction may be varied, you get a balanced power train with the larger selection of axle ratios for maximum operational versatility and performance.

340 SERIES
TWO-SPEED, HYPOID-HELICAL DOUBLE-REDUCTION

A true two-speed axle which provides two separate gear ratios through the use of two full-size helical gear sets . . . a "fast" ratio for maximum speeds and a "slow" ratio for greatest pulling power. Pick the most efficient gear ratio to meet your requirements of speed, load and road. Spring-flex power shifting provides simple, positive shifting with either air, vacuum or electric actuation. Timken-Detroit two-speed hypoid-helical double-reduction axles give a versatility and economy to trucking operations that is unmatched by other axle gear designs.



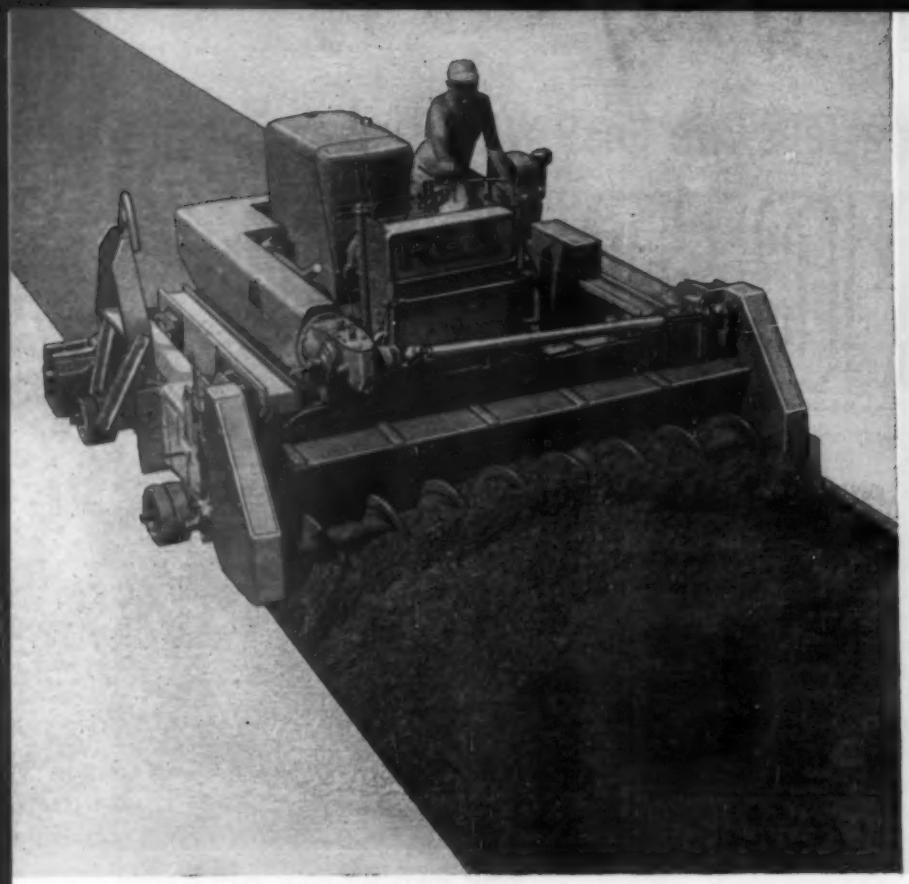
choice of two—

INTERCHANGEABLE BALANCED DOUBLE-REDUCTION DRIVES

Another Product of... **ROCKWELL-STANDARD CORPORATION**

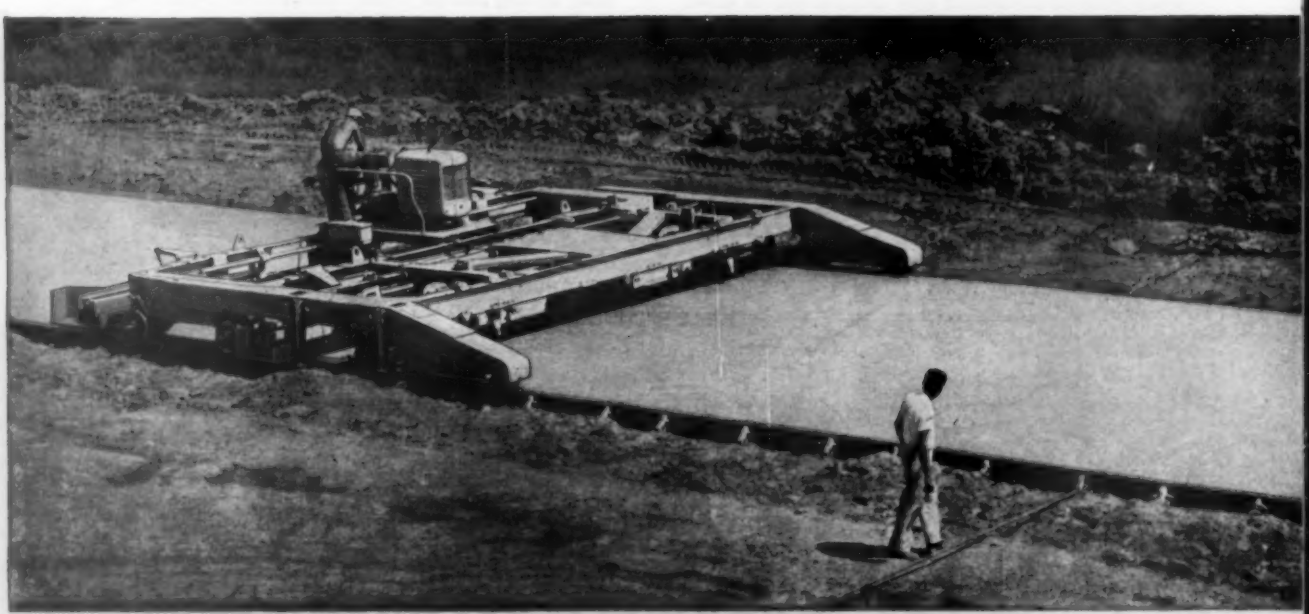
Transmission and Axle Division, Detroit 32, Michigan

. . . for more details circle 335 on enclosed return postal card



PAVE BIGGER, BETTER and more PROFITABLY with REX®

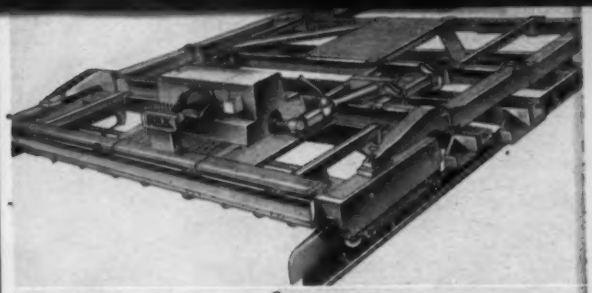
Rex Self-Widening Spreader that completely mechanizes the spreading and finishing of tapered-lane, interchange and street work. Spreads and finishes in continuous operation.



Rex Combination Finisher-Float, the single-operator machine that has amazed contractors and inspectors with its exceptional surface finishing results. Write us for list of satisfied users.

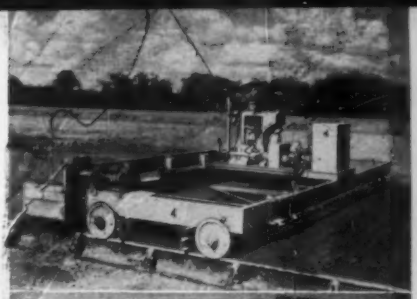
WRITE FOR CATALOGS AND SPECIFICATIONS

. . . for more details circle 291 on enclosed return postal card



NEW

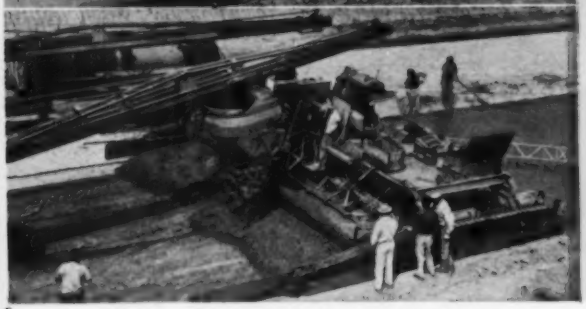
Rex Spreader-Finisher-Float Machine —now 1 machine with 1 operator in 1 pass.



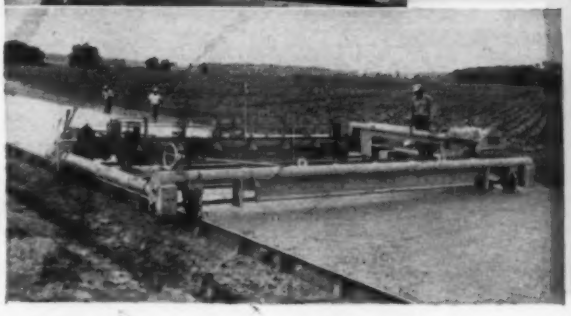
Rex Curing Machines

Rex Finishers

Rex Pavers

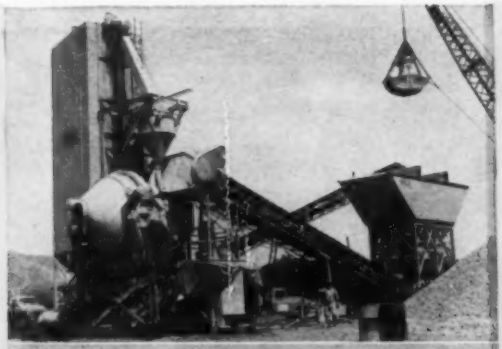


Rex Slip-Form Pavers

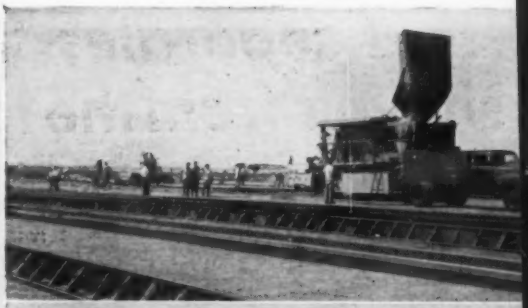


Rex Longitudinal Float Finishers

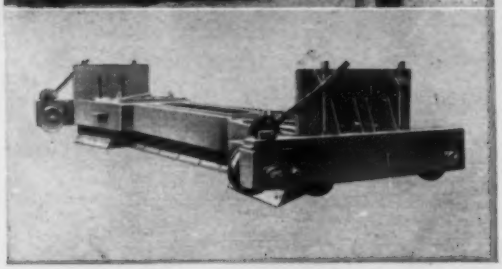
...the modern concrete paving line!



Rex Central-Mix Plants



Rex Road and Airport Forms



Rex Subgrade Planers and Testers

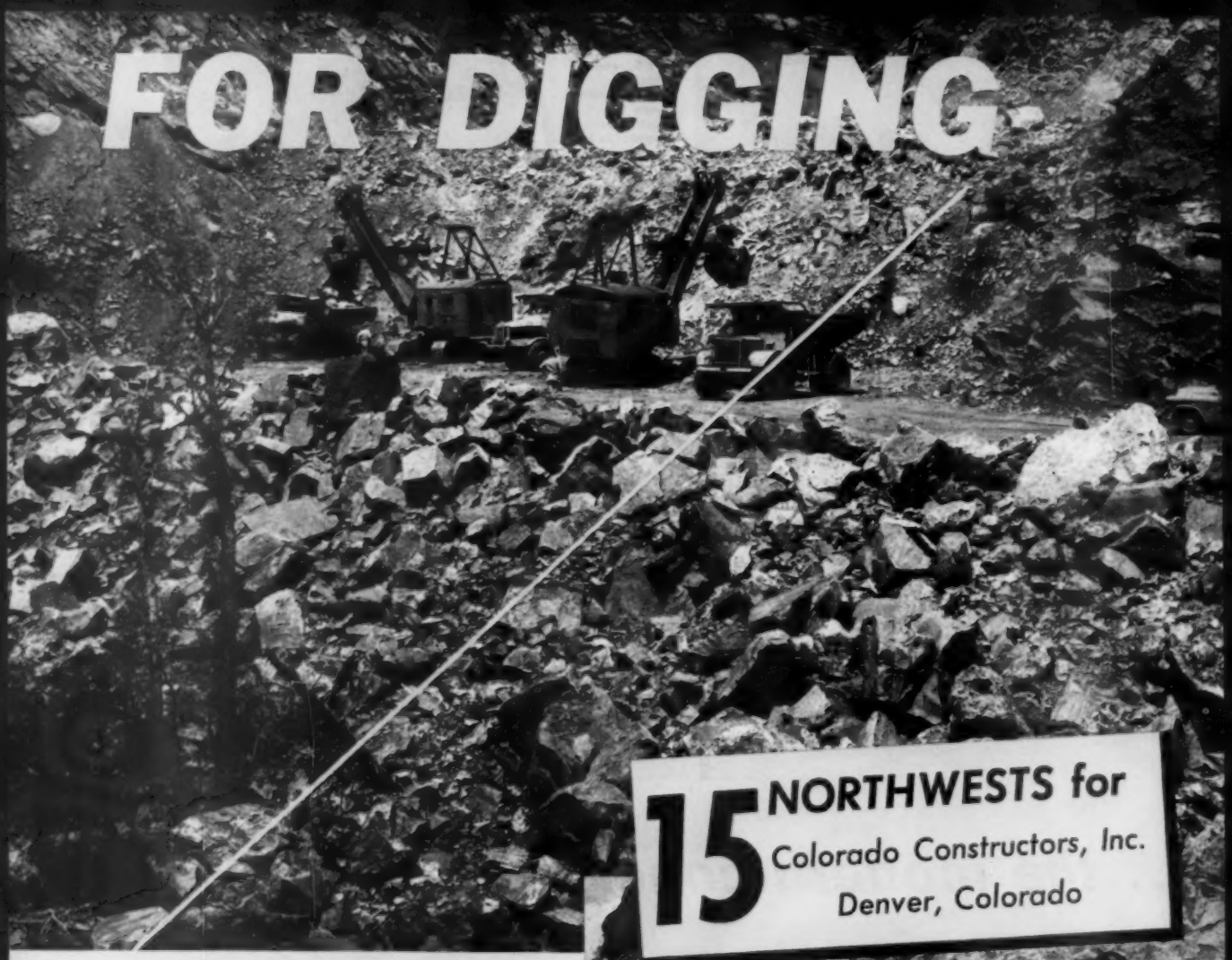
Rex Manual-Widening Spreaders

REX®

CONSTRUCTION MACHINERY

Pave bigger, better and more profitably with Rex. Talk to your Rex distributor about the world's most complete concrete paving package. CHAIN Belt Company, 4652 W. Greenfield Ave., Milwaukee 1, Wis. In Canada: Rex Chainbelt (Canada) Ltd., 1181 Sheppard Ave. East, Willowdale, Ont. Distributors in all principal cities of the world.

FOR DIGGING—



15 NORTHWESTS for
Colorado Constructors, Inc.
Denver, Colorado

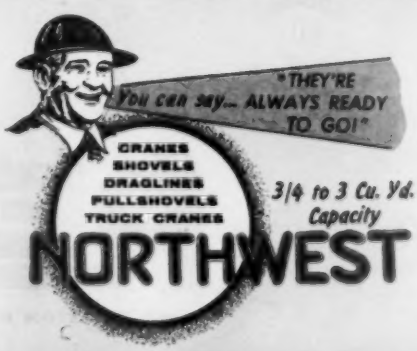
that separates the shovels from the toys

HERE's the kind of digging that breaks the heart of an operator with an ordinary rig under him. It's the type of digging that separates the *real* Rock Shovels from the toys. Two Northwest 80-D's are pouring it on to clear out the granite rock leading to a tunnel heading in widening U. S. Highway 40-6 near Idaho Springs, Colorado. The contractor is Colorado Constructors, Inc. of Denver and the new 80-D to the left is the fifteenth Northwest Colorado Constructors has bought.

Here are fourteen testimonials to performance in country where the backbone is Rock and only top performance can satisfy people like Colorado Constructors, Inc.

Your Northwest is a *real* Rock Shovel. It brings you the advantages that get the job done—the things that permit you to say, "That Northwest is always ready to go."

They are the advantages backed by the quality that makes the Northwest the finest machine of its kind.



NORTHWEST ENGINEERING COMPANY
1504 Field Building • 135 South LaSalle Street
Chicago 3, Illinois

S-80-12-LC

POWER REASONS

WHY GMCs ARE THE MOST ADVANCED CONSTRUCTION TRUCKS IN 20 YEARS

GM
DI

● Gr
perfo
exclus
compl
plete

☆☆☆

MC V-6 IESELS

SHORTEST, LIGHTEST AND LEAST EXPENSIVE TO OWN—IN THEIR CLASS!

You get rugged, compact construction . . . many inches shorter for more inside cab room, simpler servicing and full advantage of short BBC dimensions—lightest weight, up to 530 pounds less, to carry bonus payloads—two-cycle design for faster acceleration, smoother power, exceptional fuel economy and added life.

EXCLUSIVE ECONOMY RANGE GOVERNOR

Only GMC diesels have this economy range governor that positively regulates engine speed at the most efficient rpm for top fuel economy and longer engine life. Standard equipment on 4-wheelers.

BIG PULLING POWER!
HIGH PERFORMANCE!
6V-71 GMC TRUCK DIESELS

MAX. TORQUE
604 @ 1200

MAX. HORSEPOWER
197 @ 1800
to
218 @ 2100

Ratings are at sea level and 60°F.

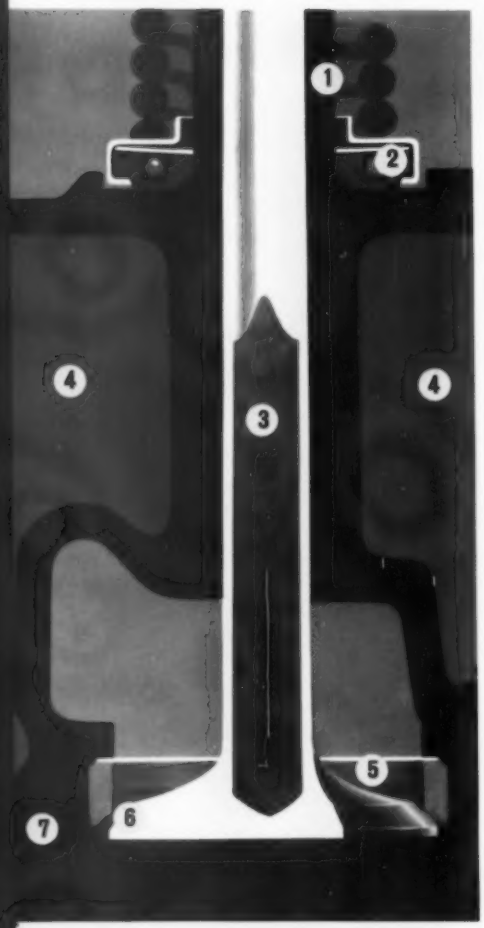
● Greatest combustion efficiency with maximum air intake from Roots-type blower ● Better high-altitude performance than naturally aspirated engines ● Save up to 5% on fuel, get up to 12 extra horsepower with exclusive automatic hydraulic fan ● Four exhaust valves for each cylinder (not just 1 or 2) assure more complete exhaust scavenging, give a cooler-running engine, lengthen valve life and provide more complete fuel combustion ● Replaceable dry-type cylinder liners are leak-proof, quick and easy to service.

218 hp. V-6 Diesel Engine is Right Out In The Open with the cab tilted. Other features of GMC steel tilt-cabs are: 72" BBC and 52" front axle location for big loads; biggest safety vision you can get; sharper turning angles; job-matched diesel power from 32,000 lbs. GVW to 76,800 lbs. GCW.

GMC's Biggest, Diesel-Powered 60-ton Tractor—DBW9000 Series with 90" BBC and 28-inch front axle location for biggest legal loads. Conventional Ninety-Inchers, with V-6 diesels, are ideally suited to all construction jobs from 30,000 lbs. GVW.

EXCLUSIVE GMC ENGINES ARE BUILT TO

Short, Stout Design! Low-Rpm Power! GMC V-6s have exclusive long-life strength. Deep-skirted block has extra-reinforcing ribs and structural superiority throughout. Full-power at low engine speed and shortest stroke of any comparable truck-built engines reduce power-robbing wear, add to greater fuel economy and provide the desired, higher performance.



Cooler-Running, Stronger, Bigger Valves... Everything For Longer Life!

1 Extra-long valve guides, integral with head, minimize stem exposure to burning gases and assure faster transfer of heat. **2** Positive rotation of both intake and exhaust valves (except 305A) give valves self-cleaning action to prevent sticking, pitting, warping, leaking and burning. **3** Valve stems are short and big diameter to practically eliminate distortion. Sodium-filled exhaust valves* more rapidly transmit damaging heat through the valve guides to the coolant. **4** Up to 176 gallons of coolant circulating every minute (over twice as much as many competitive engines) provide the flow necessary for life-prolonging heat transfer. **5** Hard, tough, special steel is used in the exhaust valve seat inserts of heavy-duty V-6 engines to withstand high temperatures and constant seating action. **6** Valve heads and ports are extremely large for better breathing. Special hard facing resists pitting, corrosion, fatigue and wear. **7** Wide bridge between valves provides added strength and big cooling areas for better heat dissipation. *(Except 305s)

HERE'S YOUR COMPLETE CHOICE OF EXCLUSIVE GMC V-6 GAS ENGINES

MODEL	GROSS TORQUE RANGE	MAX. HP.
305A	258-260 @ 1400-2200	150 @ 3600
305B	264-266 @ 1100-2000	150 @ 3600
305C & D	268-270 @ 1200-2100	165 @ 3800
351	308-312 @ 1400-2400	180 @ 3400
401	375-377 @ 1200-2000	210 @ 3400

Lower Maintenance Costs! Adjustments, repairs and replacements are easier and less costly with GMC engines. For example—spark plugs are conveniently located inside the V. Self-locking screws make valve lash adjustments a simple job. Most major parts are interchangeable between V-6 engine models, and several with Twin-Six engines. Expert service and all parts are readily available at GMC Truck Dealers located across the country.

Low Buying Cost! Low Owning Cost! That's the new GMC 105" BBC Conventional 6-wheelers with 105" BBC cab, 351 or 401 V-6s. Servicing is convenient with wide hood and roomy engine compartment. Easy-in-and-out conventional cab trucks start with choice of 34 pickup combinations and go up to 60,000 lbs. GCW tractors.

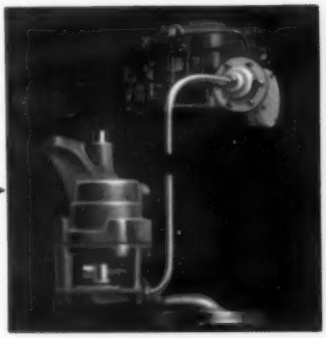
Out-Earns, Out-Pulls All Trucks In Its Class . . . GMC steel tilt-cabs with exclusive 275 hp. Twin-Six. These easy-to-service, easy-to-drive models with 72" BBC and 52" front axle placement are also available with GMC V-6 engines. Full line, 19,500 lbs. GVW to 76,800 lbs. GCW, cannot be surpassed on any construction haul.

FOR ALL THE PROFIT-FACTS, CONTACT YOUR GMC DEALER LISTED IN THE YELLOW PAGES OF

O OUT-LAST, OUT-POWER OTHER GAS ENGINES!

Greatest Pulling Power Of All! This 702 cu. in. Twin-Six gas engine produces the most usable power of any standard equipment engine. You get great reserve power at low engine speed to haul loads at part throttle under normal conditions . . . using reserve only for hills. You save fuel, reduce shifting up to 60% and get longer engine life.

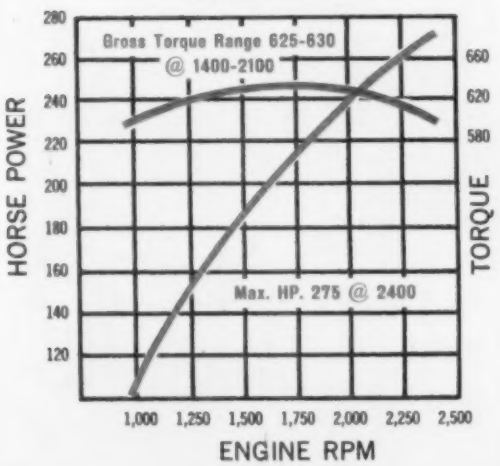
Notice The Full 3-Inch Extended GMC Skirt for the most rigid, full crankshaft support. New compact design, extra strong inner ribbing and staggered cylinders all increase strength and rigidity, decrease costly wear and failures.



Tamper-Proof, Positive Speed Control Governor! This GMC patented hydraulic governor operates by direct oil pump pressure to accurately, reliably control proper operating speeds . . . adds to engine life. Standard on 401 and 702 engines.

Exclusive V-6 Power is standard in medium-heavy duty 90° Conventionals along with easy-driving independent front suspension and easy-riding vari-rate rear springs on 4-wheel models. Ruggedly reinforced cabs with double-walls stand up on the roughest construction jobs. Heavy-duty models have the powerful Twin-Six.

EXCLUSIVE, HIGH-PERFORMANCE GMC TWIN-SIX



ES OR VISIT ANY CONTRACTORS USING NEW GMC TRUCKS.

SO SOUND, so firm, so fully packed, because the blend is right! Contractors who blend before they compact increase their profit because compacting passes are cut by as much as 50%! How do they do it? With a PULVI-MIXER, of course. It is a relatively low-cost tool, yet one of the most profitable you can own. The PULVI-MIXER homogenizes the soil, eliminates voids and moisture pockets . . . makes it ideal for compaction. Another point: Ever run into material too wet to compact? Aerate it with your PULVI-MIXER! Another: Are you wasting time and effort blade-mixing borrow material? Homogenize it with your PULVI-MIXER! The big point: Once you have used a PULVI-MIXER, you'll see ways to make other phases of your jobs easier . . . find hidden profits you never knew existed. Get the facts first hand from your A-M distributor, or write American-Marietta Company, Construction Equipment Division, Milwaukee 1, Wisconsin.

AMERICAN-MARIETTA

. . . for more details circle 278 on enclosed return postal card

New Publications

Report Analyzes Road Contract Procedures

A comprehensive analysis of highway contracting procedures has been completed by a special HRB committee. The findings—based on a survey of statutes of all states—are published in Special Report 57, "Highway Contracts." Price $4.00. Highway Research Board, 2101 Constitution Ave, Washington 25, D.C.

The study covered the entire legal range of contracts for highway construction, including contracting authority, prequalification of contractors, anti-fraud provisions, competitive bidding requirements, bonding procedures, statutory regulation of labor and wages, preference for local products and labor, and satisfactory performance.

Among other things, the legal survey found that:

1. 26 states require contractors to be prequalified in accordance with statutory mandates.

2. The minimum amount requiring a formal bid process varies from $500 in Delaware to $50,000 in Arizona.

3. Advertising requirements in advance of bid openings vary from two to four weeks. (Only in Michigan is the method of advertising not specified by law.)

4. Nine states have statutory authorization permitting use of standard proposal forms.

5. 20 state laws provide for an 8-hour work-day maximum on public works. More than half of the states provide for the determination of the prevailing wage rates of the locality in which the work is to be performed. (Federal laws have recently required such determinations for Interstate projects.)

The study was under Louis R. Morony, chairman of the HRB Committee on Highway Laws, and director of the Laws Division of the Automotive Safety Foundation.

AWS Welding Terms

The American Welding Society announces a new revision of AWS Standard Welding Terms and Their Definitions. It is the first revision in 12 years and many changes have been incorporated and much new material added. This is considered the Society's most important published Standard—the dictionary of welding.

A new Master Chart of Welding Processes has been prepared in conjunction. It shows the 39 recognized welding processes in a new color layout designed for ready reference. The chart is available in two sizes; an 8½" x 11" for desk, 22" x 28" for wall use.

Copies of the AWS Definitions (including desk Chart) may be obtained for $2.00 per booklet; or the wall or desk Chart may be obtained separately at $1.50 or $.50 respectively, from the American Welding Society, Dept. T, 33 West 39th Street, New York 18, N. Y.

Procedure Manuals

The Oklahoma department of highways, Oklahoma City, has published four new, major manuals:

A Utilities Manual will help the state staff establish standard practice to be followed by utility companies and the department in the planning, preparing and approving of utility proposals, the physical rearrangement of facilities; and handle paper work in reimbursement to the companies.

A Right-of-Way Manual given out to R-W personnel will help secure uniformity in interpreting laws and carrying out department policies.

A Farm-to-Market-Roads handbook will help guide efforts of the Oklahoma Boards of County Commissioners in placing local rural county roads on the FAS System and in programming county FA secondary projects.

Oklahoma Highways and Your Property is a brochure which will be mailed to all land owners whose property must be acquired for right-of-way.

Continued on page 48

500 TONS OF CASTINGS DAILY!

With the recent opening of plant #2, shown above, our production potential of Gray and Ductile Iron Construction and Industrial Castings has now reached a maximum of 500 tons daily. This capacity, plus 15,000 patterns, plus a good on-hand supply of standard castings, plus 90 years experience in the business, is your assurance of prompt delivery, superior quality, complete uniformity and practical economy.

* * *

New and fully illustrated 168-page catalog of construction castings will be sent promptly upon request.

NEENAH FOUNDRY COMPANY
NEENAH • WISCONSIN
Chicago Office: 5445 North Neva Avenue, Chicago 31, Illinois

. . . for more details circle 332 on enclosed return postal card

Hydraulic power makes it easy

Ease of operation, positive control, convenience — for years these and other operator suggestions have been a major factor in the design of Huber-Warco motor graders. A prime example is Huber-Warco's complete Hydraulic Control System. It eliminates fatigue, gives the operator instant positive power, allows him to operate two or more controls (all within easy reach) at once. Hydraulic power means no shoving or tugging at controls, no fear of levers kicking out of position since any cylinder can be locked in any desired position. Finer control of both heavy and the finest finish grading is assured. Best of all, Hydraulic Control develops the skill and confidence so necessary for big production. See the Hydraulic Controls as well as the other outstanding features you get in Huber-Warco motor graders and check Huber-Warco's full line of 3-wheel and tandem rollers, and maintainers at your Huber-Warco distributors soon.

HUBER-WARCO COMPANY • MARION, OHIO, U.S.A.

HUBER
W
WARCO

New Publications

Continued from page 46

SYMPOSIUM ON ROAD AND PAVING MATERIALS (STP 277). 126 plus vi pages, hard cover, 6 x 9". Price $3.50. American Society for Testing Materials, 1916 Race St., Philadelphia, Pennsylvania.

The behavior of asphalt paving mixtures in highways has been the object of much research. One of the most extensive projects has been the Zaca-Wigmore Experimental Test Road, sponsored by the California Division of Highways. The primary purpose was to observe the performance of asphalts from various sources, complying with a new specification.

Two papers by engineers of the division of highways and one by Shell Development Co., present data on the test road results.

The STP 277 Symposium also includes four other papers and discussions on asphalt and aggregate subjects.

ASTM STANDARDS ON MINERAL AGGREGATES AND CONCRETE (C-9, D-4). 396 plus xii pages, hard cover, 6 x 9". Price $5.75. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pennsylvania.

This book sponsored by Committee C-9 on Concrete and Concrete Aggregates and Committee D-4 on Road and Paving Materials includes all of the standards prepared by Committee C-9, but only those for aggregates and other selected highway materials developed by Committee D-4. In addition it contains pertinent specifications for cement which are under the jurisdiction of Committee C-1 on Cement.

The book contains 134 standard specifications, methods of test, recommended practices and definitions of terms for mineral aggregates, concrete, concrete curing materials, expansion joint fillers, reinforcing steel, paving block and brick, and bituminous and non-bituminous road materials. Of these standards 50 are new, revised or have had their status changed since the 1958 edition was published.

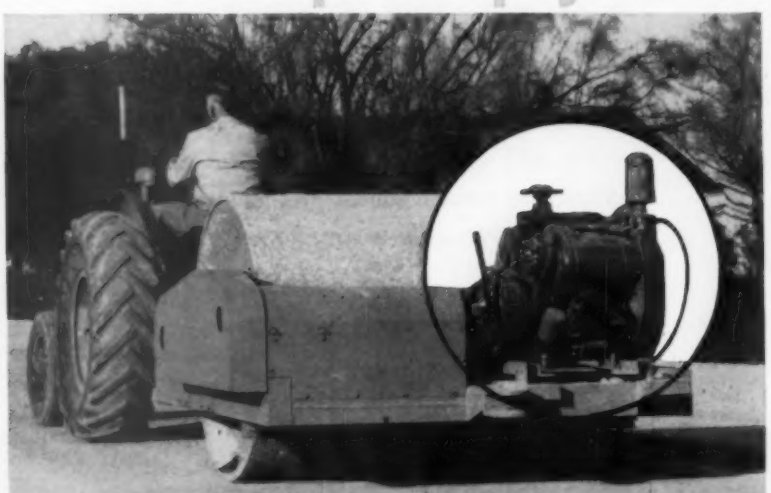
SOIL COMPACTION AND PROOF-ROLLING OF SUBGRADES. Bulletin 254. Highway Research Board, 2101 Constitution Ave., Washington, D. C. Price $1.00. This 35-page bulletin contains four papers presented at the Board's 39th annual meeting (January, 1960):

"Full-Scale Compaction studies at the British Road Research Laboratory," by W. A. Lewis, describes the test installation, techniques used, and results.

"Proof-Rolling of Subgrades," by W. J. Turnbull and Charles R. Foster, describes cases where proof-rolling will or will not be effective, and gives information usable to establish desirable roller characteristics and amount of rolling for various conditions.

Also, "Hydraulic Fill Compaction," by Olaf Stokstad and Kent Allemeier, and "Rapid Determination of Liquid Limit of Soils by Flow Index Method," by H. Y. Fang. *Continued on page 50*

Air-cooled power pays off!



VIBRATING COMPACTOR enables operator to match roller and soil vibrations for full compaction efficiency. Made by Tampo Mfg. Co., San Antonio, Tex., the 3½-ton unit rolls a strip 40 in. wide. Powered by a VG4D Wisconsin.

37-hp WISCONSIN ENGINE

packs 80-ton punch—cuts upkeep!

Are you in a tizzy about engine power? Then let a vibratory compactor help you pick the one that's best for your money — and your job.

Here's why: The above 37-hp VG4D delivers 80 tons of compacting power under terrific shock and impact. Yet it keeps the compactor roiling day-in, day-out.

Like all Wisconsins, the VG4D is precision-built for hard work and long life — to lug through shock loads without stalling. And Stellite exhaust valves and inserts plus positive rotators *make valves last up to five times longer!*

Air-cooling helps, too. It eliminates dry-ups and freeze-ups. There are no radiators, water pumps, fan belts, and other water-cooling parts to buy, service, wear out, and replace — a blessing on construction jobs.

Get the most work out of your equipment — power it with Wisconsin Engines, 3 to 56 hp. Electric starting available for all models. Get Bulletin S-254. Write Dept. C-51.

WISCONSIN MOTOR CORPORATION
MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines
. . . for more details circle 343 on enclosed return postal card

Hot-mix Texaco Asphaltic Concrete pavement is speedily laid on 11 miles of Nebraska State Highway 61. No time-consuming curing period is required.

Contractor: NORTHWESTERN ENGINEERING CO.

Nebraska builds Asphalt highway for hauling wheat crop

This 11-mile section of State Highway 61 passes through Nebraska's fertile wheat growing country. At harvest time, heavy trucks loaded with grain use the highway to reach elevators and rail heads.

The pavement constructed on this heavily traveled route consists of three inches of heavy-duty hot-mix Texaco Asphaltic Concrete, laid on a six-inch granular base. The Texaco Asphaltic Concrete was placed in two courses, a 1½ inch binder course and 1½ inch wearing surface. Nebraska used an asphalt cement with a 100-120 penetration in the pavement mix.

This Texaco-paved State Highway combines rugged durability with a moderate first cost and low upkeep cost. It is speedily laid, since it requires no time-consuming curing period. Because of its resilience and freedom from expansion joints, it has a velvet-smooth riding surface which is appreciated by truck drivers and motorists alike.

Texaco Asphalt Cements, Cutback Asphalts and Slow-curing Asphaltic Oils provide the road builder with a wide choice of heavy-duty, intermediate and low-cost types of paving for highways, streets and airports. Whatever your paving project, one of these types is exactly suited to your requirements. For helpful information on all of these Asphalt types, mail the coupon below for the Texaco brochures. There is no obligation.

TEXACO INC., Asphalt Sales Div., P.O. Box 2332, Houston 1, Texas

Chicago 4 • Denver 1 • Jacksonville 1 • Minneapolis 3 • Richmond 25

TEXACO ASPHALT

Please send me your two brochures containing helpful information on heavy-duty, intermediate and low-cost types of asphalt construction for highways, streets, airports, etc.

Texaco Inc., Asphalt Sales, P.O. Box 2332, Houston 1, Texas

Name.....

Associated with.....

Address.....

New Publications

Continued from page 48

REPAIR OF STRUCTURES AND PAVEMENT BY THIN CONCRETE PATCHING. Bulletin 260. Highway Research Board, 2101 Constitution Avenue, Washington 25, D. C. Price: 60 cents.

Contains the following reports: (1) Latex-Modified Mortar in the Restoration of Bridge Structures, by S. M. Cardone, M. G. Brown, and A. A. Hill, respectively, chief, maintenance operations division and chemical engineer, Michigan state highway department; and Coatings Technical Service, Dow Chemical Company, (2) Bonded Resurfacing and Repairs of Concrete Pavement, by William G. Westall, senior airfield engineer, highways and municipal bureau, Portland Cement Association.

IT'S THE LAW. By Bernard Thomson, with Norman A. Coplan and an introduction by Edward D. Stone. For contractors, architects, and engineers, concerned with lawsuits and damages as a result of underestimation of costs and many other sources of legal difficulties. Chapters on statutes, organization and business problems, effecting such things as bids, performance bonds, etc; legal matters pertaining to labor and employee relations; a chapter on rights and liabilities under common law.

Price $7.50. Channel Press, 159 Northern Boulevard, Great Neck, New York.

TRAFFIC ORIGIN-AND-DESTINATION STUDIES: Appraisal of Methods; Bulletin 253. Highway Research Board, 2101 Constitution Avenue, Washington 21, D.C. A 188-page bulletin giving details of a panel discussion on inter-area travel formulas and 11 pages on appraisal on traffic study methods, as presented at the 39th Meeting of the Highway Research Board in January, 1960. Price $3.80.

DESIGN OF CONCRETE PAVEMENTS FOR AIRPORTS. The welded wire fabric industry, and its trade association, Wire Reinforcement Institute, announce publication of the new WRI Airport Concrete Pavement Handbook. The 96-page illustrated book, offers designers descriptive information, data, tables, and design criteria for design of reinforced portland cement concrete pavement for airports handling all types of planes including jets.

The new handbook covers basic factors in design; concrete pavement design fundamentals; subgrade, subbase and drainage; pavement thickness; reinforcement design; construction practices; concrete overlays; advantages of reinforcement; and welded wire fabric data.

The book will be sent free to interested persons who request it on their organization's letterhead. Please address Wire Reinforcement Institute, Dept. AP-11, 1049 National Press Building, Washington 4, D. C.

Where's your small engine PROBLEM?
WEIGHT? SAFETY?
SIZE? ECONOMY?
use YANMAR
DIESEL POWER
AIR COOLED MODELS—
2 TO 4½ BHP
WATER COOLED MODELS—
2 TO 8 BHP
Easy starting—
Smooth running.
Big engine features
in a compact package!
—a precision product of the new Japan
made to U.S. specifications by the world's
largest manufacturer of small diesel engines.
Immediate delivery from large U.S.
stocks of engines, accessories and parts.
for literature and dealer information, write
CONTINENTAL MACHINERY CORP.
19402 So. Susana Rd., Compton, Calif. Mailing Address: P. O. B. 5309, Long Beach 5, Calif.
YANMAR

. . . for more details circle 288 on enclosed return postal card

ELEMENTARY STRUCTURAL ANALYSIS. (2nd Edition). By Charles H. Norris and John D. Wilbur. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, New York. Price $10.50.

This second edition of a book dating from 1948 reflects the latest technology of the field. Its 650-pages constitute a complete and authoritative text on the subject, restricted to all aspects of structural analysis.

ASPHALTS AND ALLIED SUBSTANCES. A historical review and raw materials. By Herbert Abraham. 368 pages. 6x9 in. Price $10.75. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. This sixth edition, enlarged and revised covers terminology, classification and chemistry of bituminous substances and extensive coverage of the natural raw materials. Written for chemists, engineers, geologists, salesmen, and students in the industry.

High-gear, summer bituminous operations in Douglas County, Washington

HI-WAY SEAL COATING REPORT

How Rock Savings Paid For Spreader in One Season!

***Specification*: Box that can handle sharp turns, short street work, yet take on 10-20 miles of seal coat. *Answer*: HI-WAY Model "L" Aggregate Spreader**

"Our purchase of the HI-WAY Model 'L' spreader box, after full consideration, was governed by three factors... time, people and equipment. And, its most important role has been efficient, low-cost spreading of mineral aggregates in the covering of asphaltic shots ranging up to one gallon per sq. yd. of application. *We did the same amount of work as previously, using five trucks instead of eight; used about one-third less rock, which, by the way, paid for the box in one season; and speeded up our entire operation by about one week,*" reports Mr. Pat Thomson, County Engineer.

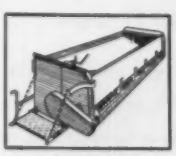
PRECISE CONTROL DOES IT

"Simple and positive lever action settings for the spreading auger permits exact control of the material and thickness of spread. The positive ejection action of the feed auger handles even oversized material that would stick an ordinary auger, not leaving the uncovered streak in the oil that you usually get. The box is self-cleaning, and the auger will bring rock out to the corners of the box until all the rock is gone. Consequently, the box does not have to be left loaded for the next spread. When it is left loaded, the box rests easily, because of its low center of gravity, on the front wheels at just the right height for easy, quick truck hitching. Gear controls are on the right side facing the back of the box, with notch adjustments from single rock up to three inch size, and remain constant without once juggling set for the spread. The box has a quick shut-off that prevents dribbling and stockpiling at the end of the spread."

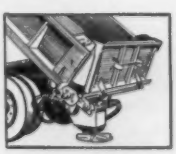
HELPS BEAT THE WEATHER

"Your representative's recommendation of this Model 'L' has given us a more productive utilization of our time: fewer dispatched trucks per hour; less repeat trips, which is important during our peak season when we work twelve-hour days. The use of less equipment, less rock and more production per hour of labor has given us a triumph over cost. Speed and efficiency of operation from this box have given us a triumph over climate, too, because we get the work done when the weather's right. This, in turn, has given us a triumph over topography in Douglas County, for we can get the light soil roads pinned down and prevent blowing."

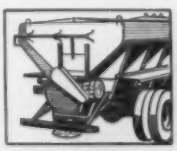
Your Nearby HI-WAY/MAN Can Demonstrate Every Type of Seal Coating Rig



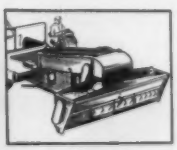
TOWED TYPE



TAILGATE



BODY MOUNTED



SELF-PROPELLED

Got a seal coating problem? Write for an answer, today!

HIGHWAY EQUIPMENT COMPANY
625 "D" Avenue, N. W., Cedar Rapids, Iowa

☐ Send me the name of the nearest HI-WAY/MAN and complete information on your seal coating line.

NAME _____

TITLE OR COMPANY _____

ADDRESS _____

CITY _____ STATE _____

PHONE _____

HI-WAY

THE FASTEST SPREADING NAME IN ALL 50 STATES

... for more details circle 310 on enclosed return postal card

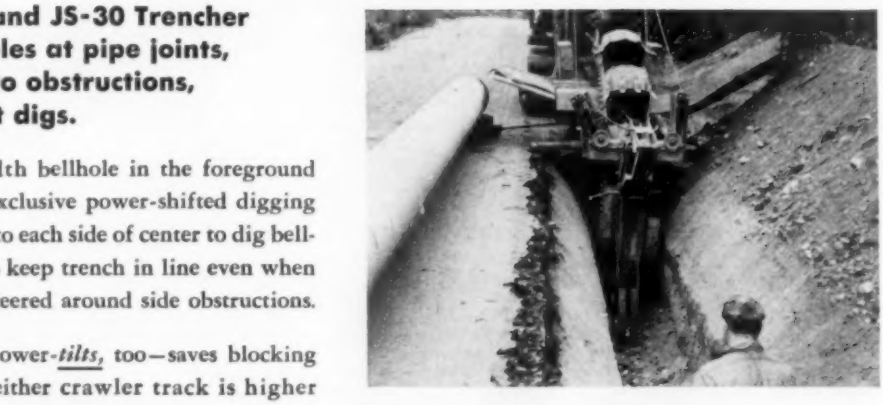
DIG TRENCH AND BELLHOLES IN SINGLE PASS

The Cleveland JS-30 Trencher digs bellholes at pipe joints, digs flush to obstructions, slopes as it digs.

Note the ample-width bellhole in the foreground above. The JS-30's exclusive power-shifted digging wheel shifts 2½ feet to each side of center to dig bellholes like this and to keep trench in line even when crawlers are being steered around side obstructions.

The JS-30's wheel power-*tilts*, too—saves blocking and cribbing when either crawler track is higher than the other on curbs, side slopes, etc.

Note, too, how the JS-30's power-shifted V conveyor with operator-controlled speeds up to 1,000′ per minute—another Cleveland exclusive—easily handled the big spoil volume from the wide-sloped trench. The JS-30 sloped the trench to 6′ top width as it dug.



The JS-30 is a trencher of amazing utility. Write today for all the facts.

CLEVELAND TRENCHER®

THE CLEVELAND TRENCHER CO., 20100 ST. CLAIR AVE., CLEVELAND 17, OHIO

. . . for more details circle 285 on enclosed return postal card

Don't Make a Single Contractor the Goat

The stories coming out of the Blatnik Congressional committee hearings on pay-offs and laxities in the Florida road program need to be brought to a head, and quickly. If the Tampa firm's role is an isolated case, or one of a few, in this state's conduct of the road program, the highway officials, the engineers and the contractors—yes, the governor—will all want this fact to be clearly established.

If shoddy work is believed to be more widespread, then let the Committee broaden its inquiry and put the blame on many firms, instead of largely on a single contractor.

It is a temptation meanwhile for people everywhere to leap to conclusions and consider the whole state under a cloud. "It does seem astonishing," the thinking inevitably goes, "that a state's political administration, including its road commission and highway department, could be so blind that things could go for several years unnoticed." The state's whole highway agency is indeed under suspicion, and honest employes should feel quite embarrassed.

On the contractors' side, contributing to any alleged wrong doing by a contractor, it is well known that when a state capitol's moral climate is deteriorated, contractors must go along with whatever custom is demanded. Such situations can get to the point where serious irregularities are Standard Practice.

It is because of thoughts of this kind that we say, clear up the Florida accusations one way or another, and speedily. Don't let them simmer along as was done in Oklahoma where the public and the highway people around the country still don't know what to believe about a state highway department that is known in professional circles to be staffed by many dedicated career people.

. . . In Brief

Incoming state governors please note:

Governor-elect Matthew E. Welsh in Indiana announced that George M. Foster will stay in his post as executive director of the Indiana state highway department. He has asked Foster to stay on in the Democratic administration "to prevent the loss of a year's construction effort . . . and to be sure that highway department efforts do not lose momentum."

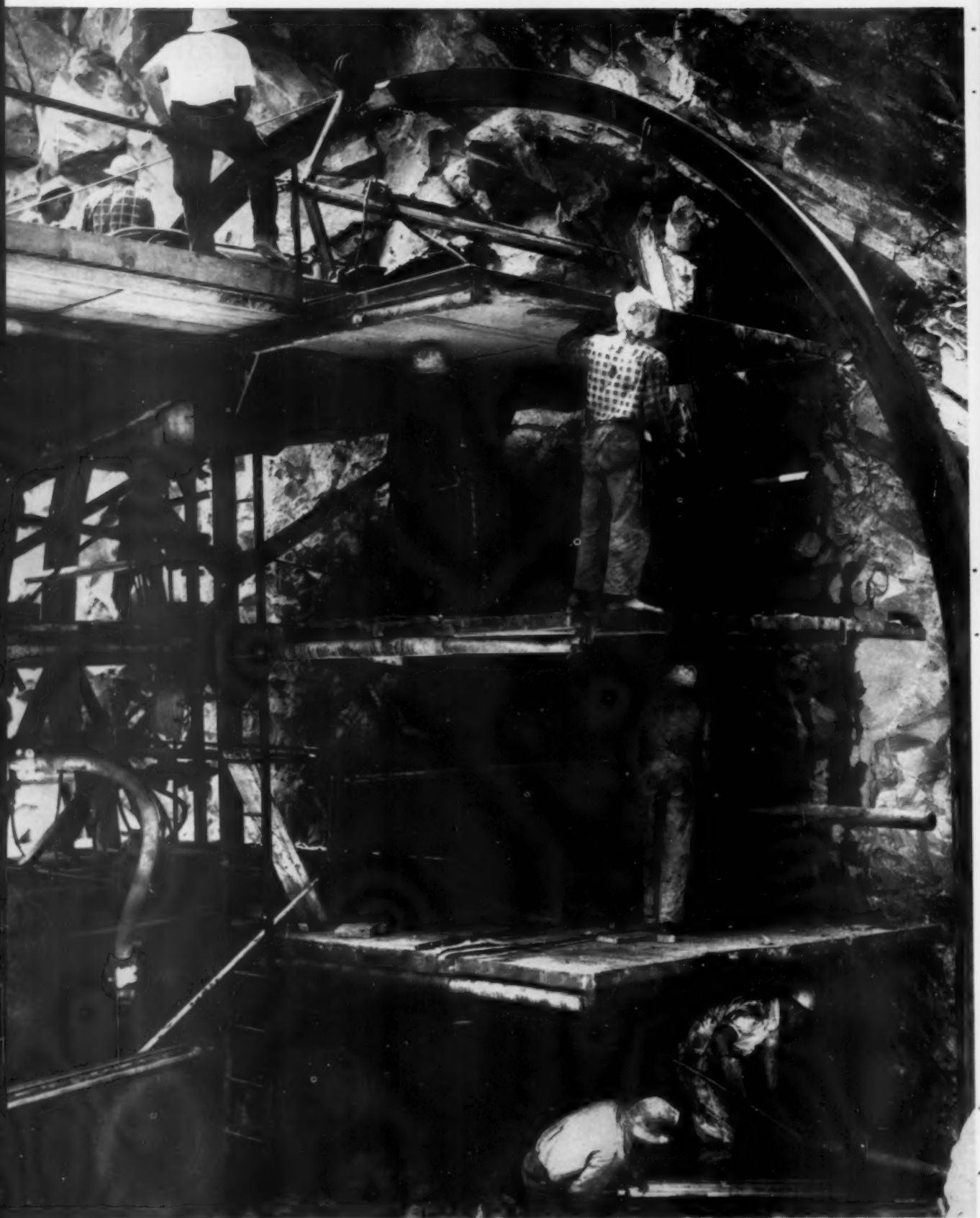
Governor Welsh said that when past administrations changed hands in Indiana, it cost the state "almost a full year of highway construction and maintenance progress."

What more is there to say here, except to note that spoils politics is a blight which can be ill afforded. It can cost the road program tremendous sums in the form of setback schedules, inefficient job performance, unnecessary high costs.

No Christmas gifts for highway department employes, please," was the admonishment which Virginia's highway commissioner H. H. Harris sent out just before the Holidays. A timely word, indeed, what with the current scandals elsewhere.

"Your letter came late," was the comeback from Engineer-Manager Frank A. Howard of the Virginia Road Builders Association. "Our contractors have already given the state a Christmas gift of $8 million in the form of below-estimate bids during 1960," noted Howard, "with likelihood that the sum will reach $10 million with the late-December lettings."

Harold J. McKeever



Jumbo crew drilling for second round at east end of south tunnel.

Controlled Blasting Kept Twin Tunnel Job on Schedule

How Colorado Constructors' rock crews maintained production in fissured gneiss

By H. K. Glidden
Contributing Editor

Drillers holed through both bores of a twin 695 foot long highway tunnel in Colorado in recent weeks. The tunnels located in Clear Creek Canyon east of Idaho Springs are part of the reconstruction of US 40 and US 6 to I-70 standards. As a means of gaining experience with the location, the Colorado department of highways in 1959 awarded a contract for a small pioneer bore along the centerline of one of the roadways (Roads and Streets, November, 1959). Colorado Constructors, Inc., of Denver, the contractors for this job, also were low bidders on the full sized tunnel project. Under their $1,745,000 contract the two bores were completed late in 1960, with preparations moving ahead on the lining.

The design of the twin tunnels, each for one-way traffic, accounts for some of the construction problems involved. The tunnels are each 32 ft. wide by 22 ft. high. However, they are separated by only 27 ft. The close spacing, together with the faulted nature of the rock, caused the engineers to place restrictions on the tunneling schedule so as to reduce the possibility of a blast in one tunnel shattering or weakening the pillar wall. The specifications required that the south bore be kept 50 ft. ahead of the north tunnel, which followed the line of the small pioneer bore finished the year before. This allowed some extra width of pillar to shoot against. There presumably would be less stress on the pillar wall from blasts in the north tunnel where the pioneer bore would have a cushioning effect. Drill hole depth was limited to 8 ft.

The contractor started this 300 calendar day contract early in July 1960 after a 41-day delay in delivery of steel. December 1 was the target date for tunnel completion, February of 1961 for the entire project.

The contractor's plan was to first complete the portal excavation on both ends. Accordingly, the west portal was started first and both tunnels driven about 100 ft. Operations were then moved to the east portal. In explaining this strategy, Frank "Slim" Merrick, tunnel superintendent, pointed out that it would be easier and less dangerous to break through into the partly driven west end tunnels than it would be to "daylight" into the overhanging portal rock.

Four-Level Jumbo

The driving of the tunnel centered around two principal pieces of equipment. First, there was a 4-level jumbo, constructed by the contractor in 1955 for the driving of the Mesa Verde tunnel. The second indispensible unit was an Eimco 105 loader.

The jumbo consisted essentially of three steel platforms, rigidly braced and welded so that they could be mounted as a unit on a truck. Two 6-in. diameter vertical posts, located about 3 ft. from the front face and spaced 12 ft. apart, were provided to anchor the drill equipment. These heavy posts allowed two drill assemblies for each of the four levels. A two-man crew operated each of the drills.

Flexibility in the drilling work was provided by an adjustable arm, extending out from each of the posts. The drill assemblies were Ingersoll-Rand DB35 IR Drifters. There were eight of them in use at all times and there were five spares. Drilling a 7-ft. hole in 10 minutes was considered good production in the hard granite.

Air came from three compressors in tandem to one manifold (two Ingersoll-Rands, 600 and 900, and a Gardner-Denver). Air pressure was kept above 105 psi. The main air line was 4-in. aluminum pipe with Wade Quicklock couplers. Flexible lines to the jumbo

Jumbo crew loaded their own holes. Compartmented chest on truck provided easy moving of explosives. Caps were in drawers at rear; explosives in the forward compartment.

were 3-in. Concord Yellow Jack rubber hose leading to a 12 ft. long by 6 ft. diameter receiver trank.

Ingersoll-Rand Carset 1⅝ in. bits were used with the drifters. Tunnel superintendent Merrick said he usually got from 500 to 600 ft. of drilling per bit. Taking into account bits that were either lost or stolen, each bit averaged about seven sharpenings during its useful life. Drill steel was made up to order by the Jim Piearce Drill Shop in Denver.

Diagrammed with this review is the standard drill hole pattern and the blasting cap delay numbers used in the south bore. The north bore was the same except that holes were drilled straight in around the pioneer bore. Holes on 2½ to 3 ft. spacing were drilled 4 to 8 ft. in the south bore and 4 to 5 ft. in the north (pioneer) bore.

Each of the eight drill crews averaged 15 holes per round for a total of about 120 holes. Water was used in drilling to reduce dust. Holes were blown clean with compressed air prior to loading.

Du Pont 45 percent No. 2 Gelex was loaded, two sticks per hole, except for the lifters where 4 to 5 sticks were used. Du Pont blasting caps (1 to 10 delay) controlled the effect of the blasting to obtain both maximum production and ease of mucking. The blasting plan was: (1) shatter the middle portion of each of the eight areas; (2) break out the surrounding rock into the shattered areas; and (3) allow the more heavily loaded lifter holes to shake up the muck pile for easier loading. The drill crews loaded their own holes within about 1½ hours after they had completed drilling, using no stemming.

The jumbo crew drilled the holes, loaded the explosives and set the tunnel lining steel. The crew worked alternately in each tunnel. While the Eimco loaded the trucks the jumbo was moved into the other tunnel for drilling. When drilling, loading and mucking were completed the jumbo moved back to set steel and then start drilling again.

The average rate of production per 8-hour day was 5 ft. in each tunnel, including setting the steel. An average of 2.6 lb. of explosive was used per cu. yd. of rock.

Primer were made up at a central explosives magazine to serve the whole job. Primers and explosives were brought to the tunnel in a compartmented chest mounted on a pickup.

The Eimco 105 worked variously with a Koehring Dumptor, a KW rear dump and Euclid rear dumps.

Continued on page 125

How Lost Days Raise Hourly Equipment Costs

Unusually wet summer? Long waits between successful bids? Read this cost analysis—first of its kind ever made

By R. L. Peurifoy
Construction Consultant
Bryan, Texas

What happens to the hourly cost of owning and opertaing equipment when weather conditions, or other causes, force a contractor to suffer a skimpy construction season?

The hourly or unit cost will increase, sometimes rather sharply, as illustrated hereafter. If the contractor has not included a contingency for this higher cost in his bid, he may be headed for financial trouble.

A contractor owns and operates equipment, whose hourly cost is calculated on the basis of using it for some predetermined number of hours per year. It is frequently assumed that earth-moving equipment will be used an average of 2,000 hours per year, and the hourly cost of owning and operating it is determined on this basis. However, this 2,000 hours, which is a reasonable national average, should be modified by an equipment owner who is reasonably certain that some other number of hours is more appropriate for his equipment. He should use the number of hours that he believes will apply to his equipment.

In any event, when the hourly cost of equipment is calculated on the basis of using that equipment for a given number of hours per year, this cost will not be correct *if* the equipment is used *fewer* hours than were assumed.

The reason for this difference is that some of the annual costs of owning and operating equipment—such as depreciation, interest, insurance, taxes, and storage—are essentially the same, regardless of the extent of use. Since these costs are constant, and since they are prorated among the hours that the equipment is actually used, the hourly costs will be higher when equipment is used fewer hours in a year. It's as simple as that. Correspondingly, when equipment is used more than the assumed number of hours in a year, these costs will be lower.

The total cost of owning and operating equipment includes the following items:

1. Depreciation
2. Interest, insurance, taxes, storage
3. Maintenance and repairs
4. Fuel.
5. Oil, grease, filters, including the cost of labor to provide this service
6. Wages to the operator

The annual costs of items 1 and 2 are usually considered to be constant, regardless of the time the equipment is used. But under certain conditions this may not be entirely true, especially for item 1, as will be explained later under Condition 2. Items 3, 4, 5, and 6 are usually directly related to the time the equipment is used. An exception to this statement would be for item 6, when it is necessary to pay wages at overtime rates because of the necessity of working overtime in an attempt to get back on schedule following delays owing to bad weather, or for other causes.

For the two conditions which are analyzed hereafter the wages paid to the operator are omitted. Likewise, the anticipated profit is omitted. Thus, the costs cover owning and operating the equipment only. If the wages are constant, regardless of the number of hours the equipment is used in a year, the effect of including wages would be to increase the hourly cost of owning and operating the equipment by a constant amount for all hours that it is used. If wages are paid at overtime rates for a portion of the time, the amounts would likely vary considerably, which would make it

Continued on page 118

Special Report:

New Waterproofing Methods for Thruway Bridges

Reviewing new painstaking procedures developed to restore decks for severe traffic and climatic conditions

By W. J. LaFleur

Assistant Superintendent of Maintenance (Structures)
New York State Thruway Authority, Albany, New York

Using new exacting techniques, bridges on the New York State Thruway are being waterproofed in a system-wide program. By late 1961 some 309 structures carrying Thruway traffic will have their decks restored using methods which the Thruway Authority has developed.

This all-out effort called the Bridge Deck Rehabilitation Program was launched in 1958. The work is being done by specialized maintenance forces, reinforced by temporary labor during the work season. The work force has been tailored for safe, efficient production under traffic with available equipment. The four-year effort is expected to cost $3,000,000.

The need for such a program is not unique to the New York State Thruway. Other agencies, particularly throughout the Northern states, having jurisdiction over high-speed, high-volume expressways are experiencing similar trouble. This includes early cracking and breaking up of wearing surfaces; leaking construction and expansion joints; deterioration of curbs, sidewalks, fasciae and substructures; and in many locations disintegration of the structural slabs themselves. In 1955, a Bridge Maintenance organization was established and crews assigned in the four Thruway divisions. Trouble was anticipated, so no time was lost in applying currently available materials in a preventive maintenance program.

It was obvious that the basic need was to seal and waterproof the structures to a higher degree than was provided in design and construction. There was evidence, still growing, that the speed, weight, frequency and unrelenting nature of expressway traffic subjects bridges to punishment greater than the designers could reasonably anticipate. Furthermore, and most important, the much higher order of winter maintenance demanded by the public increases the infiltration of brine. This together with the number of freeze-thaw cycles and the exposure generally, explains the rapid deterioration in the New York State's latitude.

Early attempts to seal consisted of silicone treatment of pavements, curbs, walks and fasciae in 1955. It was not effective. In 1956, sealing of expansion joints and construction joints was started on a general scale. All types of sealants were

EDITOR'S NOTE: Mr. LaFleur's review as given here is an amplification of a brief verbal digest presented at a panel discussion on maintenance, held at the 28th annual meeting of the American Bridge, Tunnel and Turnpike Association in New York City. This article also of necessity omits some valuable points of detail. An unabridged review entitled "The New York State Thruway Waterproofs its Bridges," is available by addressing C. H. Lang, Chief Engineer, New York State Thruway Authority, P.O. Box 189, Albany 1, New York.

Typical paving operation under traffic. Rubber-tired rollers are used to obtain best possible compaction. No creeping or "blow up" of these 1½-in. overlays has been experienced.

tried with the result that the two-component, cold-applied type emerged as most effective. But despite meticulous methods of cleaning and application it became evident that this approach, by itself, would not suffice. Deterioration of the separate concrete wearing surfaces on a growing number of bridges reached the point where removal of these surfaces became necessary. They were replaced with two-course, asphalt concrete pavements after first sealing the expansion joints with elastomeric sealants and the surface of the structural slab with coal tar pitch emulsion.

An important observation was made of a change in overall bridge behavior on the first few structures on which bituminous pavement had replaced the original concrete. The amplitude of vibration seemed to be greatly reduced and vertical movement generally dampened. This of course is highly desirable and thereupon became a prime component of the treatment that was subsequently adopted for control of deterioration, as vibration obviously aggravates the other factors of the problem.

Present Prescription

Briefly, the treatment being applied presently to the bridge decks is as follow: (It is quite orthodox except for what we have called "Grit-Tar," a material which does many thing as once and which will be described later.)

1. Remove badly cracked or broken-up areas of concrete wearing surface, cutting back to concrete sound enough to permit a bituminous over-pavement.
2. Seal all expansion joints in the structural slab.
3. Seal all areas of structural slab that have been uncovered, and also the vertical surfaces of the remaining concrete wearing course where cut or exposed.
4. Drill weep holes through the slab at all low points toward which water might drain and collect.
5. Replace cement concrete wearing surface with asphalt concrete base course material, up to the elevation of the original pavement.
6. Seal all expansion joints in the original pavement with elastomeric compounds.
7. Seal all portions of the bridge pavement, including patches, and of the approach pavements that are to be covered with top course asphalt concrete, with Grit-Tar slurry.
8. Lay a 1½-in. top course asphalt concrete pavement over the entire bridge and approaches.
9. Apply Grit-Tar with Rain-On sand over the entire area that has been repaved with asphalt concrete.

The entire structure is thus roofed over with a protective cover that has several attributes. These combine greatly to extend the expected life of the bridge and to reduce and simplify maintenance. Advantages:

1. The whole structure is benefited by a sharp reduction in vibration, with less likelihood of vibrational fatigue.
2. A defense in depth against water and brine infiltration is estab-

Truck fitted for mixing slurry. Wheelbarrow drawing slurry from 3 in. spigot on mixer.

Applying primer to concrete. Hood on pole gun protects traffic from drifting spray.

lished with a protected membranes, at not less than two horizons. Further, the elevation of the profile by 1½ in. will, in most locations, shed surface water off the ends and eliminate gutter ponds.

3. A new surface is presented to the punishing traffic consisting of 100 percent sharp silica sand, in the dry, and with no "fat" in tire contact. Texture and resultant coefficient of friction can be predetermined and maintained at will. The surface lends itself to continued refurbishment, quickly, and at moderate cost. There is no appreciable build-up of depth with time, as each re-treatment adds only diameter of the sand grains used. The pavement is secured for years by keeping it sealed with a coal tar pitch emulsion that also holds the surface sand grains.

"Grit-Tar" Explained

This is what we have dubbed "Grit-Tar"—a slurry with sand added. Slurry is not new, but it is felt that the formulations and techniques that have been developed here constitute a novel surface treatment worthy of consideration by other agencies with similar problems.

There are four materials in the Grit-Tar seal: a primer, coal tar pitch emulsion, a medium gradation sand, and a coarse graduation of natural silica sand.

Sieve Analysis of "Grit-Tar" Sand Grades

Retained On	*Medium*	*Coarse*
No. 6 Screen	0.0%	0.0%
No. 12 Screen	48% to 44%	90% to 97%
No. 20 Screen	56% to 62%	3% to 8%
No. 30 Screen	0.0%	0.0%

Grit-Tar may be used on either concrete or bituminous surfaces. Applications to concrete demand somewhat higher quality emulsion than for bituminous surfaces. To simplify inventory, storing and dispatch of materials and to avoid confusion, it has proven expedient to standardize on an emulsion that is adequate for use on concrete under traffic. Since 1956, we have experimented with many brands of coal tar pitch emulsion, with and without rubber additives, and have observed a considerable spread in quality and effectiveness for our usage. We therefore require in Thruway purchase specifications that any material offered have an acceptable history of performance for at least three years under like conditions.

For application to concrete, the emulsion should be paired with a primer specifically formulated for it. There seems to be a critical interrelationship in the ph of concrete, primer and emulsion that must be respected to get good adhesion. A proper primer, in itself, does considerable sealing, as the xylene type solvent secures good penetration into the pores of the concrete, setting up a root structure for the emulsion.

The sand used is natural silica sand, uncrushed, from fresh-water pits. It has a purity of 98% plus, MOH hardness of 7, specific gravity of 2.65, representative of the best clean commercial sand-blast grits. Two grit sizes are designated as Medium or Coarse, with sieve analysis as tabulated.

Primer must be applied to all concrete to be coated. Use about 0.01 gal. per sq. yd., depending on gauging need "by eye" to achieve an overall uniform shade of medium brown in the dried film. No "holidays," even minute ones, should be permitted. It is best to prime at least 24 hours before the slurry is applied, permitting escape

Continued on page 165

BIG! POWERFUL!

NEW CAT 630 AND 631!

A new concept in power shift transmission coupled with a new 420 HP engine...

plus other new developments . . . provides the last word in operating, service and maintenance ease and economy. The four-wheel 630 and two-wheel 631 join the widely accepted DW20, DW21 and 619 to give you an even broader choice of wheel tractor-scrapers from Caterpillar. For more facts, see the following pages. For complete proof on your job, ask your Caterpillar Dealer!

New CAT 630 and 631

Now power is put to real work with a combination of new concept in power shift transmission and all-new engine—designed and teamed to fit the power to working conditions. This tailored power train, together with unit construction, greater scraper capacity, air-actuated cable control, and new tires makes the 630 and 631 the ultimate in wheel tractor-scraper design!

POWER SHIFT TRANSMISSION

9 speeds with just 3 shifts. This new concept in power shift transmission automatically adjusts the machine to job conditions. Key to this system is a unit mounted directly behind the engine, which combines a planetary gear set with a torque converter so as to provide power to the three speed-range transmission on the rear of the main frame, in one of three ways: (a) torque divider drive (a combination of 75% direct, 25% torque converter); (b) direct drive; (c) overdrive. Result: nine different speed variations—*but* the operator need only concern himself with the three speed ranges controlled by his one lever. (A safety latch prevents accidental engagement.) The rest is completely automatic, governed by a simple mechanical-hydraulic system. Here's how it works:

Operator moves the lever to position *1*, first range, to start the machine down haul road. The machine is now in torque divider drive for easy start and greatest rimpull. As speed increases, converter is no longer required, so the transmission shifts *automatically* to direct drive. When haul conditions permit, the transmission automatically shifts to overdrive.

As speed increases, the shift indicator dial shows operator when to shift to second speed range, *2*. Again the transmission automatically goes into torque divider drive and smoothly picks up the load. As before, when conditions permit, it automatically shifts to direct drive and then to overdrive. This same cycle can be repeated in third range.

Downshifting is automatic too. As transmission senses increasing power needs, it shifts down from overdrive to direct drive to torque divider drive. When conditions require it, the indicator will tell operator when to select the next lower speed range.

Once back in the cut, operator shifts to load position, *L*. This locks the transmission in torque divider drive of the first speed range.

That's Caterpillar's new concept in power shift transmission, designed specifically for these new machines . . . designed to make them more efficient by making the operator's job easier.

ALL-NEW 420 HP CAT ENGINE TAILORED TO POWER NEEDS

Designed for the 630 and 631, this six-cylinder, 5.4″ bore x 6.5″ stroke D343 Engine is turbocharged and aftercooled. It develops 420 HP maximum (335 HP at the flywheel).

Typical of the newness is head design. The engine is parallel ported with dual intake and exhaust valves for most efficient air system. The overhead camshafts eliminate rocker arms and push rods. And the new shelf head design results in fast coolant circulation for outstanding heat dissipation.

Besides these and other new features, the engine offers the economies of the proven Cat fuel system with precombustion chamber . . . burns No. 2 fuel oil—premium diesel fuel not required . . . pressure ratio controlled turbocharger for optimum air flow throughout the engine operating range . . . aftercooler for greater air density for more complete combustion.

New 29.5 x 35 Tires. This all-new tire size was originally developed for the 630 and 631, to provide the best combination of size, capacity and rideability at the lowest cost per yard. These tires were job-proven by tough tests.

New Scrapers. Matching 28 cu. yd. heaped (21 cu. yd. struck) scrapers feature increased capacity, better loading. Sheave bearings now have 125-hour lubrication period. Other trailed units are also available.

New Cable Control. Live power provides control whenever the engine is running. Air-actuated controls cut operator effort in half, retain "feel" of control. Improved cable savers prevent breakage due to double-blocking.

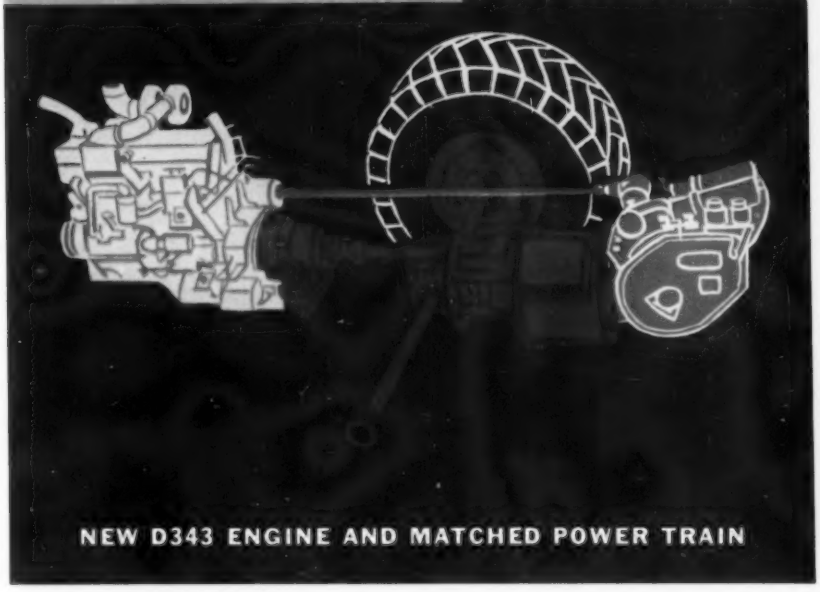
Improved Steering. New two-jack steering makes the 631 easy to maneuver, yet retains "feel" of the road. Improved steering for the 630 absorbs shocks outside the steering gear, provides easier handling in tight quarters.

match power to job conditions—automatically!

3 SHIFTS—9 SPEEDS

SHIFT INDICATOR

SPEED RANGE CONTROL



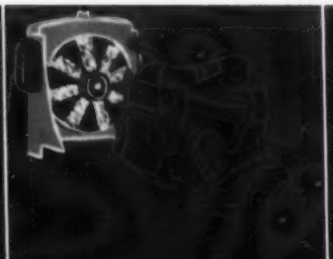
NEW D343 ENGINE AND MATCHED POWER TRAIN

FULL UNIT CONSTRUCTION—EASIER SERVICING

Transmission Units. Range transmission is case mounted for accessibility, can be removed as a unit with cable control and differential carrier. Another timesaver: torque divider transmission is removable as a unit without disturbing the engine. Transmission control units are accessible without disturbing the transmissions.

New Radiator-Fan Unit. Fan is shroud-mounted on the radiator for more efficient cooling. Now radiator, side plates and fan can be removed as a unit for servicing—or to provide easy access to the front of the engine.

Servicing Timesavers. Dash swings to expose side of 631's engine. Crankcase guard pivots for access to bottom of engine. For easy tire removal, fenders tip forward on 630, are easily removable on 631.



CAT WHEEL TRACTOR-SCRAPERS MATCH THE JOB!

High producers on adverse grades, soft going and close quarters

NEW 631	DW21	619
420 HP (Maximum Output) Power Shift Transmission	345 HP (Maximum Output) 5-speed Constant Mesh Transmission	225 HP (Maximum Output) 6-speed Constant Mesh Transmission
31.2 MPH	22.6 MPH	30.2 MPH
28 cu. yd. heaped (21 cu. yd. struck)	27 cu. yd. heaped (19.5 cu. yd. struck)	18 cu. yd. heaped (14 cu. yd. struck)

High producers on long hauls

NEW 630	DW20
420 HP (Maximum Output) Power Shift Transmission	345 HP (Maximum Output) 10-speed Constant Mesh Transmission
41.5 MPH	35.8 MPH
28 cu. yd. heaped (21 cu. yd. struck)	27 cu. yd. heaped (19.5 cu. yd. struck)
Optional 482 Series C Scraper 35 cu. yd. heaped (27 cu. yd. struck)	

For more complete information about new Cat Wheel Tractor-Scrapers, ask your Caterpillar Dealer.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

ADVANCED AS TOMORROW —CERTAIN AS YESTERDAY

Workmen measured out quick-setting glue components in small quantities.

Brushing on the glue—done not more than one-half hour ahead of the paver.

Epoxy Resin Adhesive Ties Widening Strip to Old Slab

'Miracle' glue seen to have important place in Iowa's extensive concrete pavement widening program

In Iowa the state engineers face a continued major highway widening job along with their Interstate program and other brand new roads. As of midsummer 1960 in this state, there remained 2,200 miles of 18-ft. rural primary paved roads, 1,130 miles of 20-ft., and 1,145 miles of 22-ft. pavement. Since the beginning of the widening program in 1949, the highway commission has widened more than 1,600 miles of narrow concrete paving, balanced with over 1,600 miles of new highways.

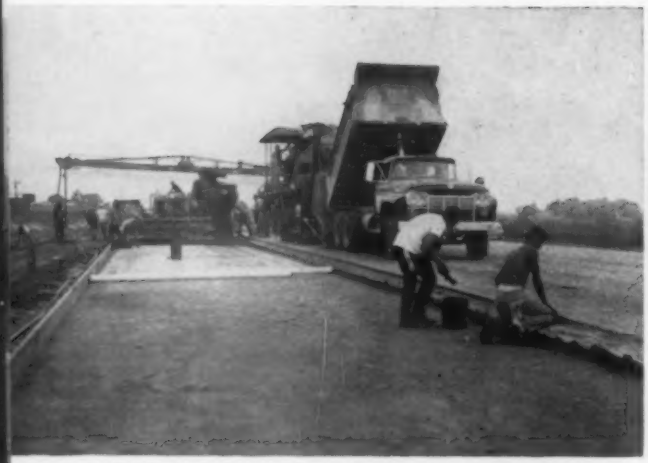
In this state the federal government's 50-50 participation is a chief reason why the 1,600 miles of antiquated highways have been widened. To qualify for federal-aid the state has had to meet certain requirements. These have involved making up-to-date traffic studies, legitimate traffic forecasts, relocations and new alignments, new design, and public hearings. All modernization projects and construction must meet recognized and expected American Association of State Highway Officials' standards.

Improved design adapted in the widening of 1.81 miles of U.S. 30 west of Cedar Rapids made use of one of the new "wonder materials," an epoxy resin adhesive. The widening strips varied on this job from 2 to 16 ft. on either side. The need for improved design stemmed from the adverse effect of the crack which has almost inevitably occurred along the construction joint where an existing pavement is flanked by a narrow widening strip. In many instances the crack which develops is either wide enough or rough enough so that the motorist hesitates to use the full widened pavement width. Iowa's use of epoxy resin is intended to literally weld the new concrete to the existing concrete with such strength that there is little, if any, likelihood of a crack ever appearing.

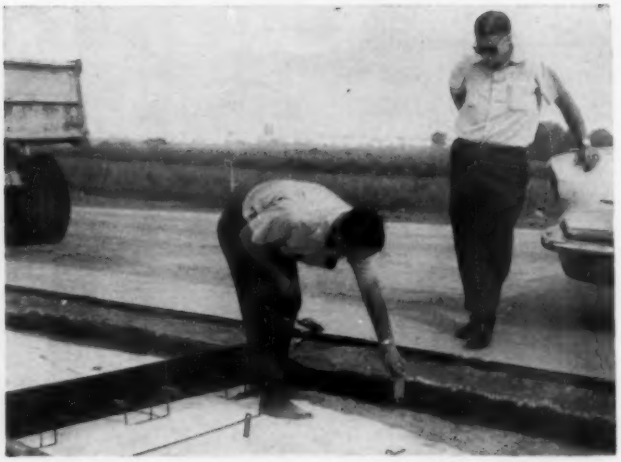
A $190,500 contract for the US 30 project embodying this feature was awarded in August, 1959, to Jackson Construction Co., Inc., of Nevada, Iowa. Major items of the contract were:

Class 10 excavation, 19,402 sq. yd. @ 80¢

Curb removal, 106.44 stations @ $50



Paving in full swing for a widening lane. A frame seen supporting paver boom to relieve excessive load on paving edge. At left, epoxy resin mixture being applied.



Inspector uses a wood block to test the epoxy glue's adhesive qualities just ahead of the paver.

Portland cement concrete pavement widening, 18,799 sq. yd. @ $5.85

Shoulders, 38.86 stations @ $10

The contract stipulated that work should commence on September 14, 1959, and be completed on December 5, and carried a liquidated damage clause of $50 per day. In 1960 following completion of the widening contract, the Hargrave Construction Co., of Cedar Rapids, was scheduled to carry out a $78,122 contract for surfacing the widened pavement with 3 in. of asphaltic concrete. Unavoidable delays, mostly attributed to the phenomenally wet 1960 spring and early summer in Iowa, delayed starting the overlay project until August 1. The project proceeded smoothly thereafter and was completed within the time limit specified.

Curb Removal and Pavement Excavation. The first step in the Jackson firm's 1959 widening work was removal of the low integral curb for which Iowa's earlier concrete roads are locally famous. This was done by use of a pavement curb removal machine such as was developed by the Iowa highway commission in 1949. This operation which has been used in Iowa with various refinements was begun by making a saw cut about 2 in. deep along the inside edge of the integral curb. The curb was then chiseled off by the machine, leaving an exposed area of concrete approximately level with the bottom of the saw cut. A jackhammer operator followed along to remove any concrete which was not chiseled to the proper depth.

Excavation for pavement widening was by conventional grading equipment. The excess material was truck-loaded and used for shoulder widening or otherwise disposed of.

Upon completion of the pavement excavation, a Cleveland form grader worked to a string line to grade for metal forms. Forms were set using a Cleveland form tamper. Then came a finegrader unit, riding the form and the pavement edge and towed by an International TD-15. The TD15's Drott frontloader bucket picked up and moved the finegrader as desired. A Cat 12 motor grader and a Galion Roll-O-Matic steel roller shaped and compacted the subgrade. Concrete was laid on the earth subgrade over polyethylene film and also was laid on 4 in. granular subbase.

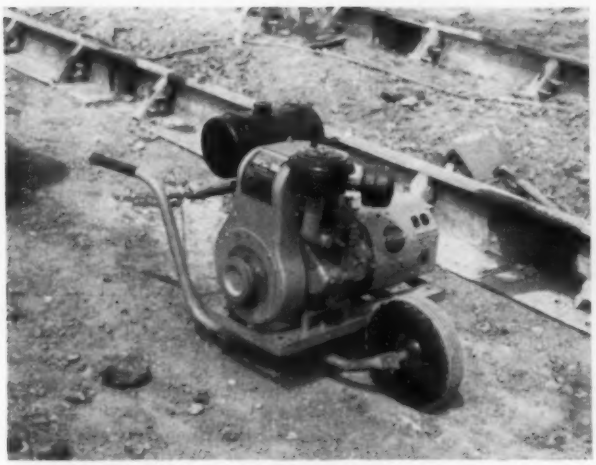
Paving Operations. Concrete paving followed conventional widening-strip methods. The paving train consisted of a Rex 34E paver served by Ford T750 trucks with 4-batch bodies, a Rex finisher and a Koehring F2A longitudinal finisher. Maginniss vibrators were mounted in front of the spreader. For hard-to-get-at places, such as turnouts, the contractor used a Maginniss model HGG 4B electric set to operate hand vibrators.

Since the mixer traveled along the near lane of the existing pavement, it was necessary to make some provision to take care of the overload exerted on the pavement when the paver bucket was at its maximum extension. The solution (see photo) was the use of an "A" frame with an adjustable leg, placed under the end of the paver boom. A workman made frequent adjustments to shorten or lengthen the leg so that most of the bucket weight was always taken on the frame.

Curing of the pavement was by wet burlap and subsequent polyethylene film covering.

The unique feature was the use of an epoxy resin to cement the joint between the existing slab and new pavements. The specifications for the epoxy resin were as follows: "The glue shall be of an approved epoxy resin type. The surfaces to be glued shall be completely free of all dust, loose concrete, moisture, oil, grease or any other foreign material. The glue shall be applied in accordance with the recommendations of the manufacturer as approved by the engineer."

The essence of the epoxy resin specification was that its use should provide a joint which was stronger than either the existing or the new pavement (See accompanying test details.)



Maginniss power tool model HGG 4B electric set powered hand vibrator, for use in hard-to-get-at places in the widening strip concrete.

Contractor-built steel box, dragged by mixer under the bucket to prevent spillage on the pavement.

A satisfactory product was ultimately secured from the Iowa Paint Manufacturing Company. This material consisted of two components (Industrial Plastic Materials Highway Adhesive Component A6131 and B6132) and a thinner. These materials come in 5-gal. cans and were hand mixed on the project.

Mixing was done at first in batches consisting of 1 qt. of A6131 together with 1 pt. of B6132 and ½ pt. of thinner placed in a 5-gal. can. Since the epoxy resin had a short pot life (it must be used within one hour after mixing), relatively small quantities were mixed at any one time. The mixing of the epoxy resin components was carefully scheduled so that later in the job the application would never be more than one-half hour ahead of the paver.

The use of thinner was reversed by the State and the balance of the glue was applied without thinner until further tests by the I. S. H. C. laboratory could be made to determine the effects on ultimate bond strength. The proportions of the batches would also be changed to approximately four parts A6131 to three parts B6132.

While epoxy resin would not come off of clothes or any other object with which it came into contact, the thinner did take the epoxy off of a workman's hands if used quickly enough. The workmen wore rubber gloves while mixing.

The application and mixing of the epoxy was a two or three man job. Ordinarily, two men worked with paint brushes to apply epoxy to the broken curb area of the existing pavement. One precaution always taken was to make certain that the broken surface, as well as the existing edge of the old pavement, was completely clean. One workman worked ahead of the crew using a steel brush to thoroughly clean the pavement edge. Brushes used to apply the adhesive were cleaned in thinner every 15 minutes or so. Carefully scheduling of this entire operation made it seldom necessary to repaint any areas.

One of the accompanying photographs illustrates the means by which Harry Robinson, inspector, tested the effectiveness of the epoxy resin immediately ahead of the mixer. The test consisted of taking a piece of wood, usually a grade stake, and placing it against the painted edge of the old pavement. If the epoxy resin strung out and showed strong adhesive qualities it was considered not to have set up beyond the point where it would perform satisfactorily

Robins H. Jackson, president and superintendent for the contractor, told Roads and Streets that the epoxy resin cost him approximately $13 per gallon. Jackson estimated that he was getting a coverage of 100 sq. ft. per gal. on the roughened areas where curb had been chipped off, and somewhat greater coverage on slab edges where the existing surface was not so rough.

This project was carried out under the general supervision of Van R. Snyder, district engineer for the Iowa state highway commission at Ames. James Lay was resident engineer.

Equipment Conference Plans Wide Attendance

Equipment maintenance leaders from the heavy-construction industry have been invited to attend the 10th annual Motor Vehicle Maintenance Conference, March 20-22, on the University of Washington campus at Seattle. Largest conference of its type in the nation, the sessions draw more than 400 persons annually. The conference has been broadened to cover the heavy-construction industry, including the industrial loggers of the Pacific Northwest.

Advance registration forms may be obtained from Professor Fred H. Rhodes, Jr., Conference Director, Civil Engineering Department, University of Washington, Seattle 5, Washington. The registration fee of $30 includes all conference luncheons, dinners and breakfast the first morning.

Tailored Lighting for New York Thruway Section

By C. H. Lang

Chief Engineer, New York State Thruway Authority, Elsmere, N.Y.

Although the New York State Thruway System is 559 miles long, only 34 miles of the system is provided with roadway lighting. The matter of lighting limited access highways is one which has been considered for years. Decision as to where to light or not to light ultimately must be decided by the money available for such purposes. Almost universal agreement exists that a lighted highway is safer than an unlighted one, but unfortunately complete lighting of all highways is not presently within our capacity either from the standpoint of ability to pay or ability to supply the power.

After a good deal of thought it was decided to confine lighting to those areas which offered the greatest accident potential. These are the heavily travelled portions which pass through densely populated urban areas, where the lights from adjacent communities and the continued merging of vehicles from the closely-spaced interchanges create distracting and confusing conditions.

Because of the magnitude of the work and the speed of construction, contract plans for the building of the Thruway were prepared by a number of different engineering firms under the general supervision of the New York state department of public works. In order to make sure that these plans contained the desired design features and a degree of uniformity throughout, each consultant was required to prepare his drawings in conformity with a set of standards prepared by the Authority. These standards, or "Design Criteria" as they are called, formed the basis for the entire Thruway philosophy of design; they were the Authority's assurance that its completed artery of travel could contain the very best in operating and safety features.

Of the 34 miles of illuminated roadway, all are in urban areas, 15 of these lie around Buffalo, the remaining 19 miles in the New York City area. All lighted portions carry heavy traffic volumes and passe through densely populated areas where the adjacent streets and surrounding terrain are lighted.

One of the spurs of the Thruway is the 15 mile long New England Section which extends along Long Island Sound through densely populated Westchester County. Its southwesterly terminus lies 3.5 miles inside the New York City line where it joins Bruckner Boulevard in the Bronx. From there it runs northeasterly out of New York City through New Rochelle, Mamaroneck, Rye to Port Chester where it connects to the Connecticut Turnpike. The New England Section has cost $92 million or an average of about $6 million per mile.

All of its 13 interchanges are free, with tolls collected at a single fixed-fee barrier stretching across the main roadways at New Rochelle. Its six lanes of divided highway, carrying an average daily 26,000 vehicles, provide a much needed artery—the only expressway in the entire area available to trucks as well as passenger cars.

This review describes the lighting provided along the 11.5-mile portion of the New England Section which lies in Westchester County. It is completely modern in concept and design, representing the best thinking of a progressive group of individuals who have had years of training and experience in this specialized field.

Roadway Lighting. The New England Section is of particular interest since it typifies the lighting used along the other lighted parts of the Thruway, and in addition includes a 900-ft. covered section and a floodlighting arrangement at the Larchmont toll barrier, requiring special treatment.

The standards called for 20,000-lumen mercury vapor lamps, a 30-ft. fixture mounting height over the pavement and the use of aluminum poles. A maintained average of about one foot-candle of illumination with a ratio of 4 to 1 (average to minimum) was specified; this spaced the luminaires about 180 ft. on centers on the same side of the pavement. Mercury vapor lamps were chosen since they offered the most efficient light source for this type of lighting and provide high levels of illumination at minimum cost.

All wiring is underground and in conduit. Poles are ballast-mounted and set in back of the roadway shoulders which in most cases required the use of 15-ft. arm brackets in order to cantilever the fixtures out over the pavement.

In all, the installation involved over 1,000 luminaires, transformer ballasts, poles and more than 50 miles of wire.

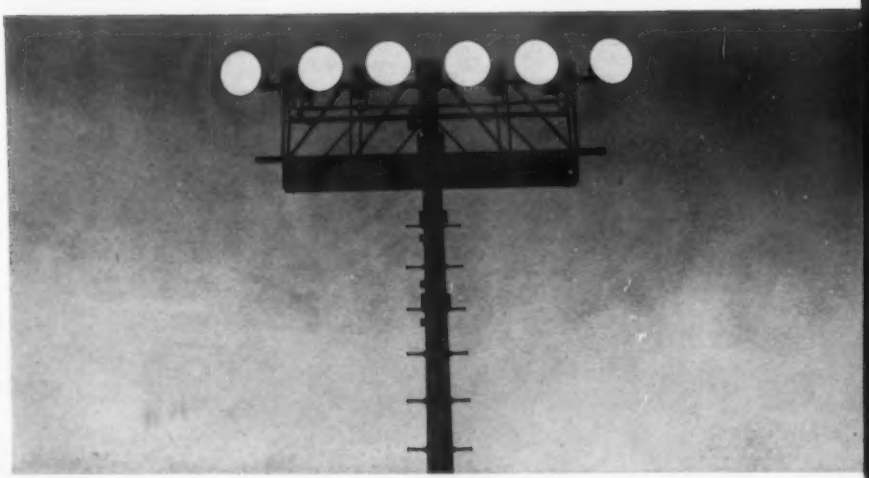
Toll Barrier Floodlighting. The Toll Barrier plaza at New Rochelle offered somewhat of a challenge to the lighting designers. On either side of the toll barrier is a wide expanse of pavement which permits the motorist to move freely across the area, thus enabling him to select, at will, any of the toll booths not in use.

In order that the entire 300 ft. x 1,500 ft. plaza area could be kept free of obstructions, the pavement had to be illuminated by floodlights mounted on 40 ft. steel poles set back of the roadway shoulders. There are 20 floodlight units in all, spaced about 200 ft. apart. These consist of from two to six 20,000 lumen mercury vapor lamps mounted on a platform on top of the poles.

Light intensity along the pave-

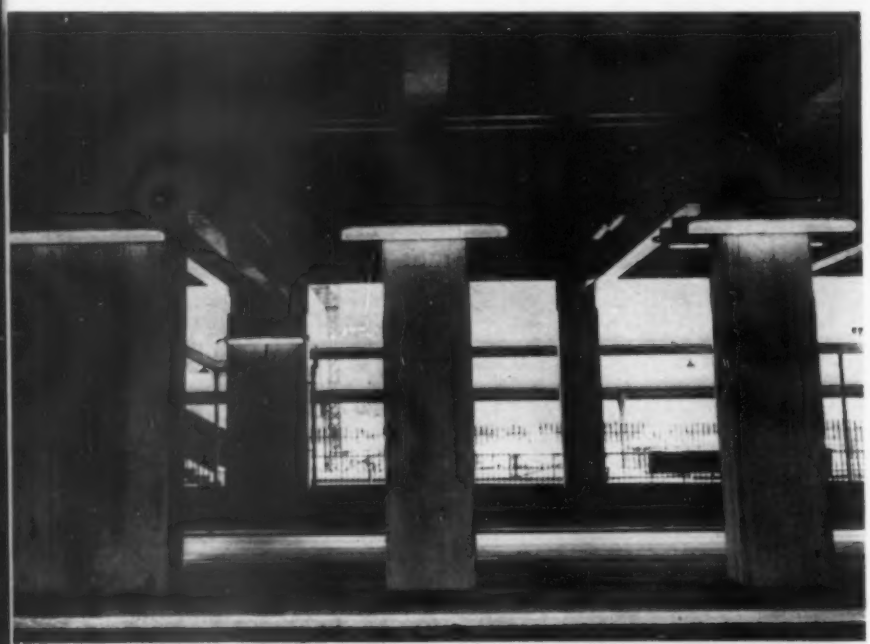
The Thruway parallels the railroad for much of its length. Light poles are set well back of the shoulders with 15-ft. pole brackets used to cantilever the luminaires over the pavement.

Mechanized equipment makes it easy to change lamps on a Thruway Ramp.



Clusters of 6 floodlights with 20,000 lumen mercury vapor lamps at the toll plaza.

Thruway motorists experience tunnel-like conditions where the overhead parking area at Larchmont forms a roof over the Thruway.



Closely spaced fluorescent lamps light up the Thruway roadways under the Larchmont Parking Area.

Top view of the Larchmont Parking Area over the Thruway.

ment approaches has been kept at about the one-foot-candle level. However, because of the supplemental lighting provided at the toll barrier, the illumination in the immediate vicinity of the booths is considerably greater than this.

Larchmont Parking Area. With space at a premium and property costs high, it was frequently necessary to relocate buildings and other impediments in order to snake the Thruway roadways through this congested area.

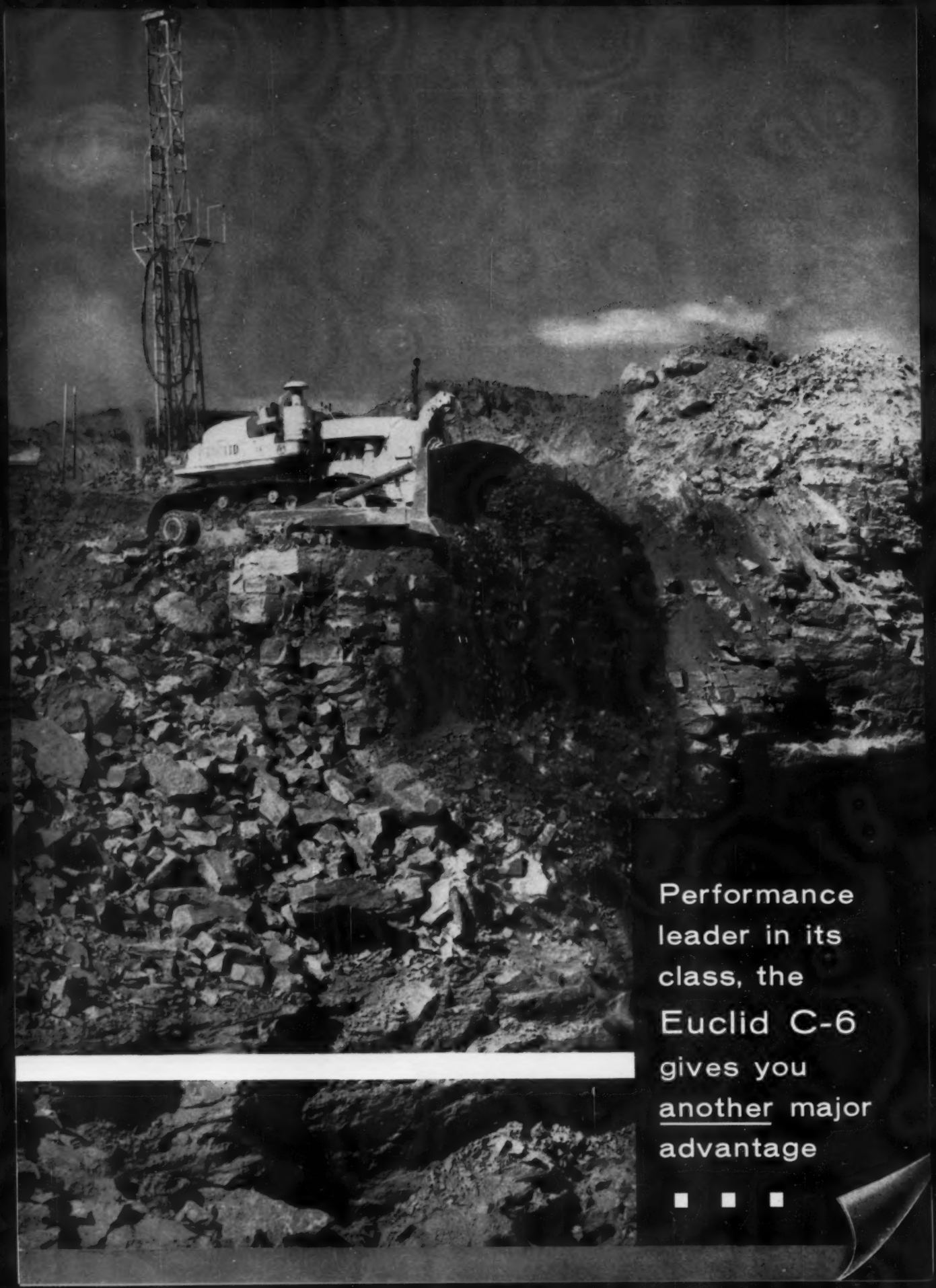
In the Village of Larchmont, the location of the Thruway absorbed the lands used as a parking area by commuters on the New York, New Haven and Hartford Railroad. Substitute space at one location could only be found by building a roof slab over the Thruway; this roof extends full width of roadways and 900 ft. longitudinally. Access is provided from the local steet system at the parking area level.

The tunnel-like effect created by the covering required special lighting attention. Here the desired level of about 1.5 foot-candles on the pavement was accomplished by mounting the fixtures, each containing two 100-watt fluorescent lamps, at 50-ft. intervals on both sides of the structure. This minimum level of illumination is provided by day as well as night.

In order to adjust the driver's eye to the rapidly changing light conditions at the tunnel entrance, the spacing of the light units was decreased considerably just inside the covered portion. This increased the level of illumination to more nearly approach daylight conditions, after which it gradually diminishes through several hundred feet to blend with the normal intensities carried throughout the tunnel.

Maintenance and Operation. All lighting is controlled through photoelectric cells which operate automatically in accordance with changes in natural light intensities.

The lighting installation has been in operation just short of a year. From this somewhat limited experience, we feel that the design has worked out quite satisfactorily. It represents a relatively inexpensive and easy-to-maintain plant. We can therefore suggest no changes or improvements now.


Performance
leader in its
class, the
Euclid C-6
gives you
another major
advantage
■ ■ ■

Savings in engine costs alone make the "Euc" C-6 today's best tractor buy

In the Euclid C-6 you get the advantages of job proved power train components . . . the reliability of the GM 6-71 engine, Allison Torqmatic Drive and Euclid's famous planetary drive . . . that help keep downtime to a minimum. You get designed-in service accessibility that's unsurpassed by any competitive crawler . . . servicing or complete removal and replacement time is well below that required for comparable tractors.

You get a big advantage, too, in the lower cost of engine replacement parts . . . savings that cut your maintenance expense to the absolute minimum. For example, pistons and rings for two competitive engines are 79% and 163% higher in cost than for the GM engine; a water pump 255% and 257% more; up to 120% more in replacement of complete engine from fan to flywheel.

EUCLID Division of General Motors
Cleveland 17, Ohio

Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland

Full-power shift . . . fast-as-a-fox maneuverability . . . and greater over-all work-ability!

Have your dealer give you all the facts and figures on the C-6 . . . you'll find that in production and maintenance cost this "Euc" gives you a better return on investment.

C-6 service accessibility cuts replacement labor costs, too!

Assuming good shop conditions and experienced personnel, these are typical times for removal and replacement of components in the C-6 and other torque converter tractors of the same class:

Component	Man-Hours	
	C-6	Others
Radiator	3	10
Engine	8	16
Clutch	none	16
Drive Sprocket	8	9.8**
Track Frame	3*	8**

*requires 70 ton press only
**requires special tools and 100 ton press

HOURS SAVED IN THE SHOP MEAN MORE WORK-TIME ON THE JOB!

GM GENERAL MOTORS EUCLID

EUCLID

FOR MOVING EARTH, ROCK, COAL AND ORE

Want better scraper versatility?

the TS-14 all-wheel drive "Euc" is the answer!

Whatever your scraper requirements may be, the Euclid TS-14 can cut earthmoving costs on a wide range of work—from small yardage jobs to the biggest projects.

All-wheel drive and 14 yd. struck capacity puts this "Euc" way ahead of other medium size scrapers in performance and overall work-ability. With a total of 296 h.p. and separate Torqmatic Drive for each axle, the TS-14 picks up heaped loads in a hurry... gets out of the borrow pit or cut fast... and really rolls on the haul road. It loads itself in practically any material... and with a push tractor it's a big producer on the toughest scraper job.

Here's a one-man earthmover that reduces your equipment investment... works more days per year... handles a wider range of work because it isn't stalled by steep grades or adverse conditions. Ask your dealer for complete information... better yet, have him show you a TS-14 in operation.

EUCLID Division of General Motors, Cleveland 17, Ohio

Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland

GM GENERAL MOTORS EUCLID

EUCLID

FOR MOVING EARTH, ROCK, COAL AND ORE

Constructive Cost Controls for Contractors
No. 7 in a series

Approaches for Evaluating Cost Information

Part I - Overall Analysis and Ratio Studies

By James P. apRoberts

Cost Control Specialist and Chief Estimator
La Canada, California

The purpose of each article in this series is to present a practical discussion of some particular phase of Cost Controls. The special importance of each of these topics to the readers of ROADS AND STREETS is illustrated by showing how it can be put to use by a typical road-builder, in order to get a better understanding and control of his costs.

Some of the recent cost control articles in ROADS AND STREETS have noted a number of the methods which may be used to obtain cost data. At this point it becomes logical to consider the evaluation of such cost information. Therefor, the object of this article is to present a general discussion of the several methods or "approaches" which a road contractor may use for analysing his costs.

The first fact which must be kept uppermost in reviewing any cost information is this: there is no single simple set of figures, or direct elementary analysis, which will portray the entire cost picture for the average contractor.

Basically there are two approaches which a contractor may take to evaluate his operating cost information. They are an overall analysis, or a detailed analysis.

Using the first of these means that a broad approach is taken, to see what changes have been occurring that could affect the general financial status of the entire company. It consists of first periodically preparing and studying a summary of the company's financial status as of some very recent date. Secondly, or even at the same time, a financial compilation is made according to a limited number of selected groupings or headings of all of the sources of income or expense for a given recent period. Generally speaking such summaries are prepared at least once a month.

Two Financial Reports

Accountants speak of the first of these financial reports as a Balance Sheet. The second one is known as an Income Statement. It is also called a Profit and Loss Statement.

The basic difference between a Balance Sheet and a Profit and Loss Statement can easily be remembered thusly: A Balance Sheet defines the worth of a business at a given moment. A Profit and Loss Statement is a summation of the results of operations over a given period of time.

When a road builder takes the second detailed approach, he separately examines the items of income and expense which were used in compiling the Balance Sheet and Income Statement. This in effect is a costwise analysis of the many details which comprise the operations of a typical construction company. This analysis should be made, not just in terms of so many dollars and cents, but as an appraisal of the significance of the relative importance of each item as a source of Income or Expense.

With this brief discussion of these two major divisions of Cost Analysis, let us take a closer look at the principal features of each.

The commonest and most generally used method of examining the financial status of any company is that of preparing and studying its latest Balance Sheet. This form of financial analysis is well known. It is quite thoroughly discussed in most textbooks on accounting; however a few comments should be made on its advantages as well as some of its deficiencies, so that the reader will realize why this writer does not advocate placing too much reliance on any one form of cost analysis.

1. The object of a Balance Sheet is to accomplish the following purposes:

U. & I. Roadbuilders, Inc.
Balance Sheet, October 31, 1960
ASSETS

Current:		
Cash on hand and in banks		$ 5,630.00
Notes Receivable	$ 2,800.00	
Less—Notes Discounted	400.00	2,400.00
Accounts Receivable		
Progress Payments	32,320.00	
M. T. Acres—Paving	2,150.00	
Rental Division—Rentals	11,140.00	
Total A/C Receivable	45,610.00	
Less—Reserve for Bad Debts	5,610.00	40,000.00
Inventories		4,750.00
Total Current Assets		52,780.00
Fixed Assets:		
Acquisition Cost	68,970.00	
Less—Depreciation	28,970.00	40,000.00
Other Assets Including Intangibles		2,220.00
Total Assets		$95,000.00
Less—Other Assets & Intangibles		2,220.00
Tangible Net Worth		$92,780.00

a. First is to show that the total value of the items known as Assets equals the total value of the items known as Liabilities plus the remainder, which remainder is the owner's share and is called Capital. The fact that these are balanced, indicates that the entries made in the Contractor's books have been checked; and that the dollar value of the Asset or "debit" entries has been found to equal that of the corresponding Liability or "credit" entries.

b. Secondly is to indicate, as closely as possible, the current value of a company in dollars and cents, according to an appraisal of its several assets, liabilities and (by difference) its capital.

c. Last, is to measure by changes in the total Capital, the increases or decreases in a Contractor's net worth. In plain words this means to measure the profitability of his operations.

Balance Sheet Limitations

2. The limitations of a Balance Sheet should not be overlooked. They include these disadvantages, which are important. But these advantages should not be used as an excuse for omitting the preparation of a periodic Balance Sheet from the Accounting Department's list of chores.

a. It is possible to have a Balance Sheet which "balances" but does not contain all the facts. This can occur when some cost or income entries and the corresponding adjusting entries are not made prior to the time that the books are balanced. Such omissions are generally unintentional and are usually "caught" and entered in the next Balance Sheet.

b. A Balance Sheet is usually prepared at monthly intervals. Because of this fact it is quite possible for significant changes (or the indication that such changes are occurring) in the value of assets and liabilities to go undetected too long, simply because of the long interval between reports.

c. Errors in the valuation of Assets, caused by such common mistakes as failure to take frequent physical inventories, or to make adequate allowances for depreciation, obsolescence and periodic maintenance, can give a consistently misleading picture of the Company's true worth.

d. When a Balance Sheet is the only method used for reporting a Contractor's worth, the only way to ascertain changes in income is by comparing changes in Capital.

e. Sources of Income and Expense are not ordinarily indicated by the Balance Sheet. They must be shown on the Income Statement, which therefor should be available along with the Balance Sheet.

Despite these disadvantages, the use of a Balance Sheet is certainly to be recommended as a report which is very essential to a Road Builder, in order to understand his net worth at the time that it was prepared. It, together with an Income or Profit and Loss Statement, is frequently required by bonding agents before they will issue any kind of a performance of Material Bond for a new client. These two statements are also often required by banks and other financial institutions before issuing loans or an extension of credit.

The other over-all indicator of a business's condition which was mentioned earlier in this article is of course the Income or Profit and Loss Statement.

In the case of road contractors, the Profit and Loss Statement can be prepared to cover the operations of the entire company, the progress of a single large project, or—where more than one construction firm is involved as in a joint venture—the progress of that particular merger.

But regardless of the type of company or project covered by a Profit and Loss Statement, it is a summary of the results of operations expressed in terms of the Income and the Operating Expenses which were received and incurred during a certain period of time. This statement is composed of a summation of the income classified according to sources such as Sales, Discounts, Rentals, and Progress Payments. Likewise, the sources of expense are noted in such summary groupings as Wages, Material Purchases, Equipment Costs, Payments to Sub Contractors, Rental Charges, Taxes and Withdrawals by the Owners.

Many roadbuilders' accountants consider the Profit and Loss (or Income) Statement to be of more direct value to their client and employers than the Balance Sheet. This is probably because it is a compilation of data that is expressed directly in dollars regarding understandable divisions of income, expenses and profits incurred over a given time.

With such data it is often possible for the contractor to get a better appreciation of (1) the distribution of his sources of income and his expenses (2), the general progress of his business, and (3) changes in the nature and trends of his operations.

Case of 'U. & I. Roadbuilders"

However, both the Income Statement and the Balance Sheet in themselves are only mere collections of figures. The amount of useful information that can be obtained from them depends on how they are interpreted and evaluated. To demonstrate this, let us consider the following very condensed Balance Sheets and Profit and Loss Statements which were taken from the mythical 'books' of the hypothetical roadbuilding firm known as "U. & I. Roadbuilders Inc.," shown on these pages.

These hypothetical financial statements are actually quite a bit briefer than the type which would be acceptable to a contractor with the volume of business which was indicated by them. It was stated earlier in this article that a bona fide, true-to-life set of statements covering the financial affairs of an actual well organized firm would contain more detailed information on major components of the Assets and Liabilities, as well as the sources of Income and Expense. Nevertheless, these abbreviated statements can serve as models for introducing some of the important facts related to the analysis of a company's financial well being.

"Navigator's Charts"

We shall begin by noting that financial statements are to accountants what charts are to navigators. Just as some symbols mean a clear passage to the seafaring men, and others warn him of hidden reefs and potential hazards; so certain conditions are seen by the trained accountant as danger signals and still others which mean that he can make valid recommendations which will help the firm to continue to grow.

In the case of financial statements, however, it is not the separate or individual figures which help to define the tendency of a company to be either prospering or in financial straits as much as the comparison between these figures. These comparisons are of two kinds. They may be between the various cost elements on a given set of statements. Or they may be a study of the changes between two or more sets of statements.

The first type of analysis is known as "Ratio Analysis." It will be briefly outlined in the remaining portion of this article. The second type—comparative analysis of financial statements—will be covered in the next month's article. Both of these techniques are important in examining a company's financial progress. Neither one should be overlooked or omitted in favor of the other one.

U. & I. Roadbuilders, Inc.
Balance Sheet, October 31, 1960

LIABILITIES

Current:	
Notes Payable	$ 2,480.00
Accounts Payable—Trade	1,500.00
Due Subcontractors	6,500.00
Equipment Accounts	8,140.00
Taxes Payable	1,500.00
Other Payables	4,460.00
Total Current Liabilities	$24,580.00
Fixed Liabilities	
Note Due June 1, 1961	$ 5,000.00
Total Liabilities	$29,580.00
Capital:*	
Capital Stock	$46,000.00
Surplus	19,420.00
Total Liabilities plus Capital*	$95,000.00

*Capital is also designated as "Proprietorship" or it is also sometimes spoken of as "Owner's Equity." On the other hand, Working Capital is determined as follows:

Current Assets	$52,780.00
Less—Current Liabilities	24,580.00
Working Capital	$28,200.00

Ratio Analysis

By way of introduction there are three classes of ratios which may be used in examining (a) statements of Assets and Liabilities or Balance Sheets and (b) statements of Income and Expenses or Profit and Loss Statements. The *first* group are known as "balance sheet ratios." They refer to the relationship between Asset and Liability items. The *second* group are very appropriately called "operating ratios" for they are concerned with the ratios between sources of expense and sources of income. The *last* group comprises the ratios between items on the profit and loss statement and those found on the balance sheets.

Typical "balance sheet ratios" which are frequently used are (1) Current Assets to Current Liabilities and (2) Current Liabilities to Tangible Net Worth. The following are examples of each of these ratios.

(1) Current Assets to Current Liabilities. According to the October balance sheet the Current Assets totalled $52,780.00 and the Current Liabilities amounted to $24,580.00. The ratio between these two sums is often spoken of as the "Current Ratio." Dividing the Current Liabilities into the Current Assets in this case will give a Current Ratio of 2.15 to 1. Such a ratio indicates that the company is fairly solvent and may have some reserve of credit and working capital.

(2) Current Liabilities to Tangible Net Worth. The object of this ratio is to provide a comparison between what the company owns and what it owes. In this particular case the amount of the current liabilities ($24,580.00) would be divided by the value of the U. & I. Roadbuilders' Capital Stock and Surplus, $65,420.00. The resulting ratio of 0.38 means that the company is considered to be worth roughly 2½ times its liabilities.

Operating Ratios are especially useful to quickly compare sources of income and expense, and thereby determine the relative importance of any or all of the several items which comprise the Profit and Loss Statement. For this reason Profit and Loss Statements are frequently prepared with a percentage column on the right hand edge. This column gives a percentage

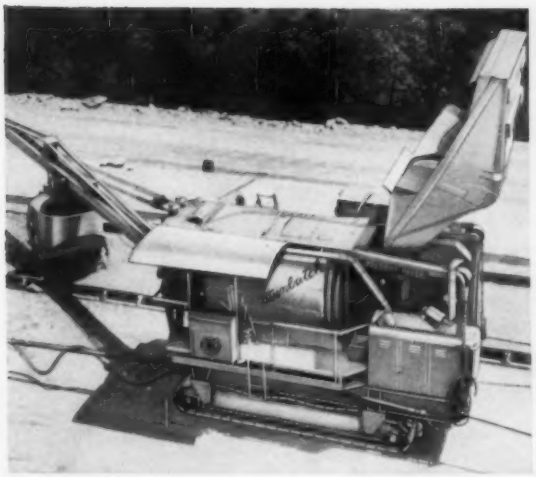
Continued on page 82

If you're looking for spread equipment that runs like a watch... keeps in time with contract demands...

Koehring TRIBATCH Paver delivers 43% more output over dual-drum pavers without change in other spread equipment or batch plant. Produces 124 batches per hour. Leading contractors everywhere are turning to TRIBATCH, getting outstanding results. Ask for catalog.

Let Koehring help you pave the way

Count on Koehring



This 34-E Twinbatch Paver will pour over 85 batches an hour on a 60 second mix cycle. Ideal for teaming up with the TRIBATCH paver on big volume jobs and for handling medium-sized paving jobs alone. Has unmatched record for dependability and production among dual-drum machines.

Harsh, wet or dry . . . all consistencies of concrete can be handled quickly, efficiently, by the Koehring Longitudinal Finisher. Produces smooth, mechanically accurate slab with uniform crown transitions. On the job above, it finished 1214 batches a day.

Koehring Transverse Finisher gives you three traction speeds for finishing, one for traveling. It finishes slab from 10 to 30 feet wide, meeting strict specifications. Two adjustable oscillating screeds. A single lever control assures uniform crown transitions.

Mobile 16-E Paver puts your curb, gutter, centerstrip and scattered paving jobs on a profitable basis. It's as mobile as your batch trucks. High elevated discharge makes pouring to overhead hoppers, forms, and chutes easier. Useful as a utility unit or general purpose paver.

to Bigger Profits in '61

KOEHRING

DIVISION OF KOEHRING COMPANY

Milwaukee 16, Wisconsin

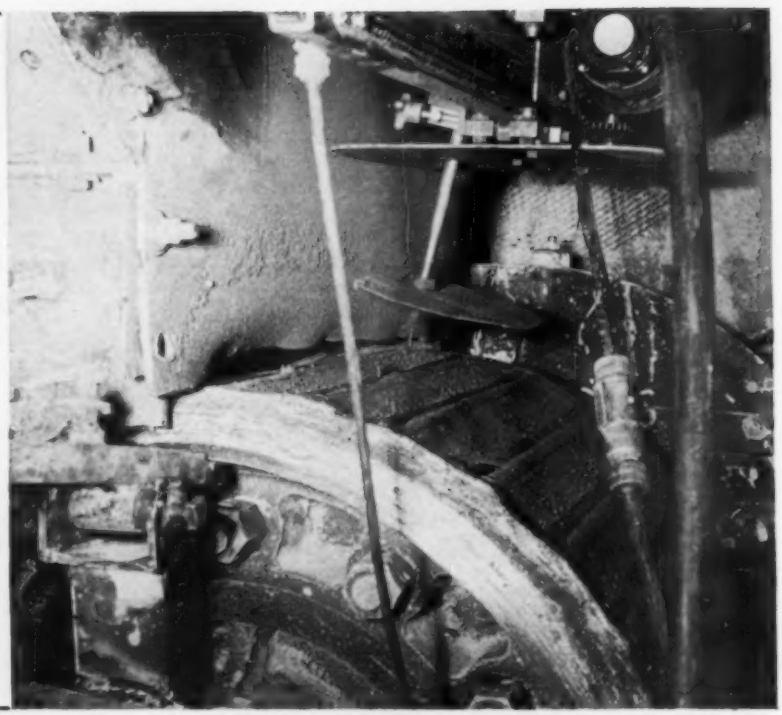
R191

. . . for more details circle 347 on enclosed return postal card

Announcing the

STOODY CRUSHERMATIC

a system for automatically rebuilding and hard-facing crusher rolls ***in position!***



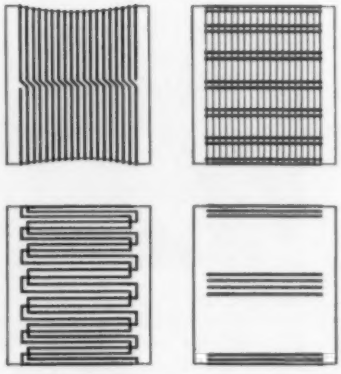
The Stoody CRUSHERMATIC is a new tool for the aggregate producing industry! It cuts rebuilding and hard-facing time on crusher rolls as much as 300 to 400% over manual welding and is 200% faster than hand-held semi-automatic welding!

Now you can gain *50% more crushing time*—get an *additional 30% more production* from the same crusher because rolls are *kept* out to size... are far more efficient!

Crushermatic is completely portable... ready to use in 20 minutes. It consists of a reciprocating, motorized carriage and wire nozzle supported on a rail over the crusher roll. Continuous wire, fed through the nozzle, can be deposited in a variety of weld patterns—all made possible by a versatile electronic control and an independent slow-speed roll drive. Crushermatic deposits up to 20 lbs. per hour, utilizing a standard semi-automatic wire feeding unit and power supply capable of 100% duty cycle. Deposits are sounder and more uniform than with manual or hand-held semi-automatic application.

Crushermatic does not replace your weldor—it simply removes him from the cramped smoke-filled area of welding. He sets up the unit, supervises welding *from outside the crusher.* It's safer, faster and eliminates long hours of back-breaking labor.

Detailed Crushermatic data is available from your Stoody Distributor—check the Yellow Pages of your phone book—or write direct!



A wide range of weld patterns can be set up with the electronic controls for rebuilding any specific wear problem.

STOODY COMPANY

11908 E. Slauson Avenue, Whittier, California

... for more details circle 340 on enclosed return postal card

(Left): Wire rope cable being reeled out by U.S. Steel's Cyclone Fence Department for 13,000 lin. ft. of Flexiguard highway median barrier on a Los Angeles freeway. (Right): After the three cables were tensioned, special cold-drawn steel fittings were fastened with electric wrenches to the H-column line posts. This cable-and-fence barrier is reported to uniquely combine strength and resiliency against vehicles bouncing into it.

Resilient Cable-and-Fence Barrier, Median Answer

Another noteworthy example of highway median barrier, California freeway style, is to be seen along a segment of the Golden State Freeway. U.S. Steel's Cyclone Fence Department has completed erecting 13,000 lin. ft. of the approved and tested California fencing on this busy artery in the Los Angeles area. The fence is part of a grim, all-out program to reduce the frequency of head-on collisions on divided high-speed expressways.

Called "Flexiguard," the median barrier, shown here being installed, combines the strength and resiliency of three wire rope cables plus chain link steel fabric strung on steel H-column line posts. Posts set 8 ft. apart are centered in the 16-ft. divider of the four-lane freeway.

The steel mesh acts as a resilient trapping device to prevent high-speed vehicles from crossing the median strip into oncoming traffic. The steel cables will tend to keep cars from overturning or swerving back into their original traffic stream.

This Cyclone fence installation was one of the first to be completed following the extensive full-scale dynamic tests of 15 barrier designs by the Materials and Research Department, California State Division of Highways. (See Roads and Streets, April and August, 1960.)

"The combination cable-chain link barrier, when used in a median strip wide enough to allow a deflection of about 8 ft. from its centerline to the edge of the pavement," states the department's report released earlier this year, "will (1) act as a positive barrier, (2) minimize the possibility of the approach type of accidents by retaining the vehicle within the median strip, and (3) slow the offending vehicle gradually and thus minimize the probability of injury to its occupants."

The detailed accident study was the first of its kind and scope dealing with highways which carry very heavy traffic volumes. It included a statistical and engineering analysis of 8,000 accidents occurring on 265 miles of various types of divided highways in 1956 and 1957, according to state highway engineer J.C. Womack.

COST INFORMATION

Continued from page 77

breakdown of the principal cost and expense items. By studying these percentages, the problem of expense analysis is simplified.

As an example of how Operating Ratios may be used for evaluating Cost Information let us consider some of the items which were contained in the "U. & I." Company's recent Profit and Loss Statement. By studying the percentages noted on that report, such significant facts as the following become apparent:

What Statement Reveals

A. Nearly one-third of the company's income is derived from incidental operations. This shows that the company has profitably entered into other lines of work and apparently benefited from such diversification.

B. The company's General and Administrative Expenses consumed 67.1 percent of the Total Gross Income. Income from Contract Work represented 67.0 percent of the revenue which made up that Total Gross Income. Thus it appears that (1) the added income resulting from Equipment Rentals and the Gravel Plant is responsible for the company's profit and (2) the company should make a strong effort to improve its revenues by improving the profitability of its Contract Work. In fact, if the Cost of Getting Jobs or Bid Expense is included together with the cost of Financial Expenses, it would appear that most of the company was running at a loss!

C. At first glance the Cost of Getting Jobs appears to be on the high side. It equals one-tenth of the value of Contracts Outstanding and represents nearly one-sixth of the Total Expenses. Furthermore, there is nearly a 1:1 ratio between the Cost of Getting Jobs and the Operating Profit.

Such an array of operating ratios would put any Estimating Section in a poor position. Therefor questions such as these should be asked in order to get a better understanding of what the Cost of Getting Jobs is considered to include:

1. How much of the Office and Secretarial Expense has been charged to this Item?

2. How do these costs compare with those noted on previous Profit and Loss Statements? Or: are they unusually high because of a number of unusual expenses, for such items as Special Cost Surveys and Office Equipment Purchases, which are non-repetitive and actually represent an Investment?

From these few observations based on only a limited part of a very abbreviated Profit and Loss Statement, it can be seen that a great deal of benefit can be obtained by analyzing the Operating Ratios. If a serious situation is indicated, then obviously a closer examination of the elements comprising this Profit and Loss Statement is indicated—along with the need for more frequent Profit and Loss Statements in order to better observe and control operational costs and expenditures.

Some of the reasons for studying the ratios between items on the Profit and Loss Statement and those on the Balance Sheets (i.e. Assets or Liabilities) are these:

1. To more easily reconcile the two sets of statements.

2. To quickly recognize significant changes and trends which can occur during a relatively short time.

3. To be able to anticipate from these changes the courses of action which should be considered with respect to future plans for expanding and meeting competition.

Several ratios have been developed between Operating Data and Asset or Liability items. The most used ones are between such items as Tangible Net Worth or Working Capital and such P. & L. Items as Total Income or Net Profit.

As a general rule, these ratios are more significant when compared over a period of time when taken at a single instance. This applies even when the company may be making an application for financing because a company's ability to pay in the future is frequently based upon its past performance.

The trends which can be developed as a result of observing the long term behaviour of the following ratios, can be invaluable in determining the progress and financial status of any company. These ratios are:

1. Net Profits to Tangible Net Worth.

U. & I. Roadbuilders, Inc.
Profit and Loss Statement

January 1 to June 30, 1960

Item	Amounts		Percent
Income:			
Contracts Outstanding	$1,862,501.00		
Less—Uncompleted Work	256,324.00		
Contract Revenue		$1,606,177.00	
Less—Cost of Contract Work		1,522,927.00	
Income from Contracts		83,250.00	67.0
Other Income:			
Equipment Rentals—Profit	35,600.00		
Equipment Sales (Loss)	(6,600.00)		
Income from Gravel Plant	12,000.00		
Total Other Income		41,000.00	33.0
Total Gross Income		124,250.00	100.0
Expenses:			
[1]General & Administrative	83,532.00		67.1
Financial Expenses	3,246.00		2.4
Cost of Getting Jobs (Bids)	18,625.00		15.3
Total Expenses		105,403.00	84.8
Operating Profit		18,847.00	15.2
Extraordinary Expenses		450.00	0.4
Net Profit Before Taxes		18,397.00	14.8
Federal, State and Local Taxes		9,057.00	7.3
Net Profit After Taxes		9,340.00	7.5

1. Apart from those general and administrative expenses which were pro-rated to the various Contracts and included in the heading of Cost of Contract Work.

2. Total Income to Tangible Net Worth. (Also spoken of as "Turnover of Tangible Net Worth").

3. Turnover of Working Capital.

The first of these is an excellent basis for measuring managerial efficiency. For example, assuming that the "U. & I. Roadbuilders'" Tangible Net Worth over the recent six months' period was $93,000.00 and their Net Profit after Taxes etc. was $9,300.00, then the Ratio of Net Profits ot Tangible Net Worth was 1 to 10 which is remarkably good. In other word, a return of 10 percent was paid on a $93,000.00 investment. This high return thus indicates that the owners of the company at that time got a very good return on their capital investment. If this ratio should drop, then the owners might do well to consider transferring their capital to some other investment.

The second ratio in construction work is obtained by dividing the Tangible Net Worth into Total Gross Income. It is a measure of how actively the firm's capital is put to work. Too low a figure for this ratio means that the company was not using all of its resources and too high a figure indicates that the capital is probably being overworked and an increase in operating expenses may be forthcoming.

The third and last ratio is similar to the second in that it represents a measure of the company's financial activity. It is preferred by some accountants to the "Turnover of Net Tangible Worth" because it reflects the company's usage of actual working capital. This ratio is obtained by dividing the working capital at the close of a given period into Total Gross Income (counterpart of Net Sales for a commercial business). For the "U. & I." Co. this ratio is about 4½ to 1. It also explains why in many construction businesses financial expenses equalling a third of the Net Profits After Taxes are not unusual when the turnover of working capital is too fast.

In concluding, let it be said that sound financial controls are an integral part of any successful construction firm. They are based upon workable yardsticks which measure not only the rate of growth but also gauge continuous changes in performance. In this article we have discussed some of those "Yardsticks" namely, Balance Sheets, Profit and Loss Statements and Ratio Analysis. The following article will be concerned with some of the methods and techniques for making a detailed analysis of cost information.

As ever, inquiries and comments from readers of Roads and Streets are welcomed and will be answered as time permits.

Extra Copies of This Article Available

Free on request the Editors will be glad to supply mimeograph copies of No. 7 in Mr. apRoberts' series on Constructive Cost Controls for Contractors. Write us on your company letterhead.

Discussions of this article or any of Mr. apRoberts' series will be welcome from contractor company principals or staff personnel concerned with estimating, cost keeping, accounting and profit control.

Address The Editor, Roads and Streets, Gillette Publishing Company, 22 West Maple Street, Chicago 10, Ill.

Gritty mud would mar the markings on most tapes!

This Chrome Clad® tape is Lufkin's 50-foot ANCHOR model. It *looks* quality in its hand-sewn leather case . . . it *is* quality.

A special kind of electroplating protects the tape from the damage of mud, sand and grit. The bold black markings are bonded to the steel base . . . protected by layer after layer of electroplating . . . topped by a final coat of tough chromium. Glare free, corrosion resistant, longer lasting—this is the tape preferred by every professional. Available with markings in feet, tenths and hundredths.

Measure for measure, the finest made...

LUFKIN

SAGINAW, MICHIGAN

. . . for more details circle 323 on enclosed return postal card

Two more contractors report outstanding production with sensational new LW Tandems

Ask the California firms, Boeck Paving Co., and Construction Graders, Inc., how you can *double* scraper capacity — with *no increase* in prime-mover, pusher, or operator costs — and you'll get this answer: LeTourneau-Westinghouse Tandems! These firms work and own 2 V-Power C Tournapulls® with Tandem Fullpak® scrapers. Here's how these LW machines performed on subdivision projects at Fullerton, California.

Move 5000 yds in 6½ hours

The job handled by Boeck Paving required moving tough-to-load black-organic clay-gumbo. The site was hilly and cycles less than 1000 ft. Even on this short-haul work, and using operators new to the tandem idea, the C 'Pull* Tandems turned in a performance beyond expectations. In just 6½ hours, these 2 LW machines *moved 5000 pay-yards!*

Superintendent for Boeck Paving, Bill Conners, says, "There's just no question about the production increase you get with these C Tandems. Every dirt man in the country knows how well LW scrapers load . . . and hooked-up in tandems, they're still fast!"

This C 'Pull Tandem, one of two used by Boeck Paving, is loaded with 36 heaped yards in an average of 45 seconds. Owner reports that C Tournapull — equipped with a 270-hp V-8 diesel — has plenty of power to work up grade in tough material. This point was clearly illustrated when the C 'Pull showed it could *self-load both scrapers* in 2 min down a 20% grade.

Completes job in 12 days

Another good example of high-production earthmoving with LW scrapers was the 20-acre grading job handled by Construction Graders, Inc., of Orange. This project was completed in just 12 days . . . and *all* 60,000 yds of earth was moved by the 2 C Tandems and a 7-yd D Tournapull.

More adaptability

In addition to increased production, the LW units used by Boeck and Construction Graders offer sensational adaptability. For instance, on a smaller-yardage job where space is restricted, the firms can simply unhook the 2nd scraper on the C Tandems. Then, since both firms own 2 C Tournapull prime-movers to pull water wagons, they can unhook the wagons and use the 'Pulls to power the 2 extra scrapers — providing them each with 4 C 'Pull "single" scrapers. With LW Tandems, you are in a *more favorable competitive position*, and you'll make *more profit on every job*.

Only LeTourneau-Westinghouse offers you a *practical* way to use tandem scrapers for *double* capacity on every trip. That's because of LW's exclusive electric control system — which sends working power *any* distance with *no* loss of efficiency — and LW universal swivel-hitch that permits *complete* maneuverability. We will be happy to give you complete details.

Operator for Construction Graders, Inc., spreads the first of two scraper loads. He accurately controls action of bowl, apron, and tailgate of *both* scrapers with simple, finger-tip switches. Maneuvering one of these high-production units is as easy as handling a single scraper. With positive electric steer and LW universal swivel-hitch, operator can perform every standard maneuver, including full U-turns and back-ups with no *tendency* to *jackknife*.

This rubber-tired 218-hp Tournatractor® is another LW tool used by Construction Graders, Inc., to speed its earthmoving jobs. Here, unit levels fill and tows discs to break-up material dumped by the high-production C Tandems. LW tractor *drives anywhere* to complete scattered push, pull, and dozing jobs *fast*.

*Trademark CTP-2303-DCJ-2

LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

. . . for more details circle 324 on enclosed return postal card

Tips in Buying Workman's Compensation

By Preston Shepherd

Contrary to a widely held view among road builders, Workmen's Compensation insurance cost is not a fixed dollar amount.

The rates vary by job classification and by jurisdiction of the various state rating bureaus. Rates and workmen's benefits may change each year. The insurance premium is modified by the all-important experience modifications, a new modification is published annually at the renewal of your policy. Insurance companies offer a wide variety of rating plans, dividends and premium discounts.

Among the three major cost areas of your bid—labor, material, insurance—Workmen's Compensation can be the most directly controlled. Potentially it is your most flexible operating expense.

Here is a handy guide to keep in mind in estimating, depending on your location. Each state has enacted a separate compensation law. But in most states where private insurance companies are permitted to handle Workmen's Compensation, these general points will assist you:

Classification and Rates. Never guess rates or use out-dated ones. Rates are in constant change. It's a simple matter to obtain the current rates from your carrier. Check on classification variances between states.

Standard Premium. This is a valuable term to learn and not to confuse with any other. Standard Premium = Payroll X Manual Rates X Experience Modification. From this basis are computed practically all rating plans. With this formula calculate your estimated standard premium for every job.

Experience Modification. In most states a regulatory body records and maintains a comprehensive analysis of your past experience. Your record may be better or worse than your competitors'. Accordingly, your standard premium is adjusted. You can acquire an up-to-date analysis of your rating data either from your carrier or your state bureau. If you're an interstate operator, your experience is compiled in New York. Write to your state bureau or the Interstate Compensation Rating Bureau, 200 E. 42nd, New York, New York.

Accident Frequency. An insurance theory is that you have much more control over the frequency of accidents than their severity. This works vigorously in computing your experience modification. Be aware of the vital importance of controlling small, seemingly insignificant injuries. These, in proportion to the big, serious injuries, hurt you far more in dollars and cents.

Key Safety Man. It's you, the boss. You can make it work and make it profitable simply by attitude toward safety. Plan safety and accident control methods in advance of starting construction. Use your insurance carrier. You're paying for accident prevention assistance in your rates. Effective safety begins with the "specs".

Retrospective Rating or Premium Discount? Ask 100 insurance people this question and you're apt to get a 50-50 response. The answer must be: "It depends." Retrospective rating has been called "cost plus" rating. Perhaps this is oversimplifying, but essentially retrospective rating is a process of speeding up the regular experience modification process which covers a three-year period. Retrospective rating should be considered with these rules-of-thumb:

a. When annual standard premium is large enough to sustain a large claim.

b. When your experience modification has entered into a debit situation.

c. When you have better-than-average control of your accidents.

Rember: Workmen's Compensation rates are predicated on a 60 percent loss ratio. This means that out of ever $10,000 in premium $6,000 is expected to be paid in workmen's weekly benefits and medical bills for injuries. This is the average. If your particular position does not fit an above rule-of-thumb—or if you can't produce less than a 60 percent ratio—then a premium discount plan is probably better suited for you.

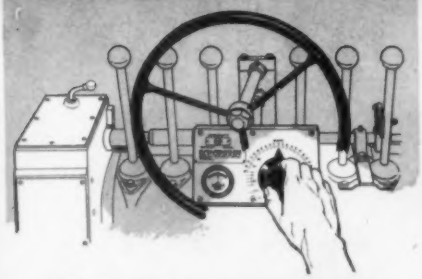
Net premiums will vary between mutual and stock companies. So will premium discounts. Retrospective rating plans will vary. Also, your jobs will each present new and different problems.

The cost of Workmen's Compensation can easily mean the difference between profit and loss. The difference might win or lose a bid.

Get the most from your insurance company. It's a partner you can't afford to treat as a "silent partner".

Radio Maintenance

The New York State Thruway Authority has a three-year agreement with Motorola Communications and Electronics, Inc., for maintenance of its state-wide two-way radio system. The $300,000 contract covers around-the-clock maintenance and replacement of needed parts on the Authority's 61 base stations and approximately 650 mobile units.



NO GUESS WORK HERE

Quad City Construction's 660 POWER-*Flow* grader with Dial-A-Slope blade control spreads sub-base to exact specifications. By doing *automatically* the important job of maintaining the desired transverse slope, Preco blade control makes operator's job easier — permits fast, accurate work!

Grader with automatic blade control sets pace for fast paving schedule

On any of today's road jobs, you're likely to run into the same problem Quad City Construction Co., of Rock Island, Ill., did in building 2.4 miles of four-lane Rt. 24 near Quincy. With 56,371 sq yards of 8" concrete to lay, Quad City needed a fast, accurate machine for final-grade work — to keep far enough ahead of pavers for efficient, speedy operation.

Quad City's choice: a LeTourneau-Westinghouse POWER-*Flow*® 660 grader with Preco Dial-A-Slope automatic blade control. And this choice was a good one: the 190-hp torque-converter machine worked faster than another type grader formerly used . . . stepped up paving schedule . . . substantially reduced operating time and costs. Here's why:

Smooth, accurate control

The LW blade mechanism is firmly mounted on the heavy-duty circle for chatter-free operation. Strong T-shaped drawbar gives firm circle support for accurate control. And with Preco Dial-A-Slope blade control *automatically* maintaining desired transverse slope, operator is free to concentrate on his reference line. Result: he gives you a finished grade in up to *50% less* time!

We will give you complete details on LW graders . . . 85 to 190 hp. Preco Dial-A-Slope blade control — one of 7 attachments available — can be installed easily in a few hours on any new or used current model LW grader. Ask for a demonstration.

ANOTHER SATISFIED USER

of LW grader with Preco blade control is Calumet Paving Co., of Indianapolis, Ind. Here, "660" blades sand base-material along edge of concrete strip. Contractor used a guide wheel that rolled along edge of pavement. Preco controlled slope to accurate specs.

G-2354-DCJ-1

. . . for more details circle 325 on enclosed return postal card

LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

On Guy F. Atkinson's Golden State freeway job. Urban projects such as this can be as "remote", requiring as much communications planning, as a road job in the wilderness. Traffic streams are just one of the physical barriers overcome by management's use of radiotelephone.

Action in a base station on Guy F. Atkinson Company's spread on the Golden State Freeway job. The equipment fits comfortably atop a file cabinet in an office trailer on the job.

How Radio Brings Order To Complex Urban Job

Guy F. Atkinson Company has the kind of contract that separates men from boys—three miles of the Golden State Freeway construction including 21 bridges in an industrial section of Los Angeles.

It's a situation made to order for chaos: a six-lane highway closely paralleling the spread is perpetually jammed with traffic pouring on and off existing freeways at each end of the job; a half dozen arterials cut directly through the roadway and a massive three-tiered interchange is being built over the Fletcher Driver-Riverside Intersection—one of the busiest spots in that part of Los Angeles.

"It's rough on a man with ulcers," laughed one of the job's supervisory staff as he gulped down a glass of milk. "Unsuspected trouble can develop fast under these conditions. I stay near a radio so I can listen for trouble spots. This way we're usually able to head them off before they become serious."

Staying near a radio isn't much of a problem on this job. More than a score of the Motorola mobile receivers plus four base stations tie Atkinson's project staff together. Sitting in Atkinson's trailer office listening to the 'traffic' over the Motorola Compa-Station, you get a fractured view of the job and of the scores of unforeseen problems that can develop.

"We have three other base stations on the spread," noted the superintendent; "one at the garage, another at the saw and a third at the batch plant. Most of the radio equipment is in our pickup trucks. Right now we have 21 mobile units and as you can tell, the receivers don't gather much dust."

Atkinson's supervisory staff men note that the importance of continual radio contact between foremen up and down the spread is particularly dramatized on a job like this one.

"You need flexibility on this kind of project and the radio gives us flexibility," explained one of the foremen. One of the office men added that it allowed the staff to cut corners closely and safely on details that affect costs as well as production.

While we talked, the radio chatted endlessly. An excavation foreman at the far end of the job called the garage to report a broken dozer cable. A carpenter foreman ran down some badly wanted 2 x 4's by broadcasting his need to all who could hear. The concrete superintendent on a wingwall pour talked directly to the batch plant operator in an effort to speed the truck arrivals.

"The radio doesn't replace thinking," remarked the superintendent. "It doesn't allow us to do things we couldn't do without the radio. It simply speeds up job reaction to problems and decisions.

"Take this morning, for example. We were getting ready to bring in piling over one of our haul roads. The road was too rough. In five minutes we had a motor grader blading and in another ten minutes the trucks were rolling. Sure, if we didn't have radio communication, we'd have still got that road smooth, but it would have taken an extra half-hour to find the blade operator and in the interim, we'd have traffic backed up all over this part of town."

Radio communication, though common on jobs spread out over large areas, is frequently looked on as of marginal value on a smaller job. Atkinson's people believe that this is not the case at all.

"No matter what the size of a project in a congested area, the contractor has more than his work to consider," explained one of Atkinson's executives. "Problems affecting the public are one of our constant concerns—preventing property damage, accidents, traffic pile-ups. The state specifications may not cover all the individual problems, but the problems have to be dealt with just the same."

We were driving down Riverside Drive paralleling the spread while we talked. Near an intersection the Atkinson superintendent spotted the splintered remnants of two barricades guarding a roadside excavation. Interrupting our conversation, he radioed an excavation foreman and arranged to have the barriers replaced immediately.

"Now there's a case in point," he continued. "One way or another, we'd have a new barrier up there by quitting time. This way, we've got the problem solved immediately and who knows what might have happened between now and quitting time."

What shortcomings do Atkinson's personnel find in radio communication?

One project superintendent reports an occasional tendency on the part of some men to feel the radio eliminates individual planning.

"They feel that with the radio on hand, problems can be solved at the last moment simply by calling someone else. We watch for this sort of thing, particularly with new foremen, and straighten it out before it becomes a habit."

Atkinson's job executives have less fear of problems getting 'away from them' through their ability to follow job developments and give directions from any of four base stations or 21 mobile radios.

Equipment noise often drowned out radios on Atkinson service trucks. Now, with speaker mounted to rear of the cab, the mechanic can hear calls even when he is away from his truck working on noisy equipment.

This Atkinson foreman is in contact with all parts of the complex Golden State Freeway job through his mobile radio.

"Radio's efficiency is its own worst enemy," was the surprise statement of one project boss. "You get the feeling that if you can keep a job running smoothly with 20 mobile units, you could do that much better with 30. You've got to realize that there's a saturation point. After you reach that point, each unit you add reduces your efficiency by maybe a unit and a half."

On the Golden State spread, the Atkinson organization has mobile units distributed among superintendents and foremen of the excavation, concrete, carpentry and labor crews as well as the two service trucks operating out of the garage. The two flatracks held on the job and the truck of a subcontract storm drain crew are likewise fitted with mobile units.

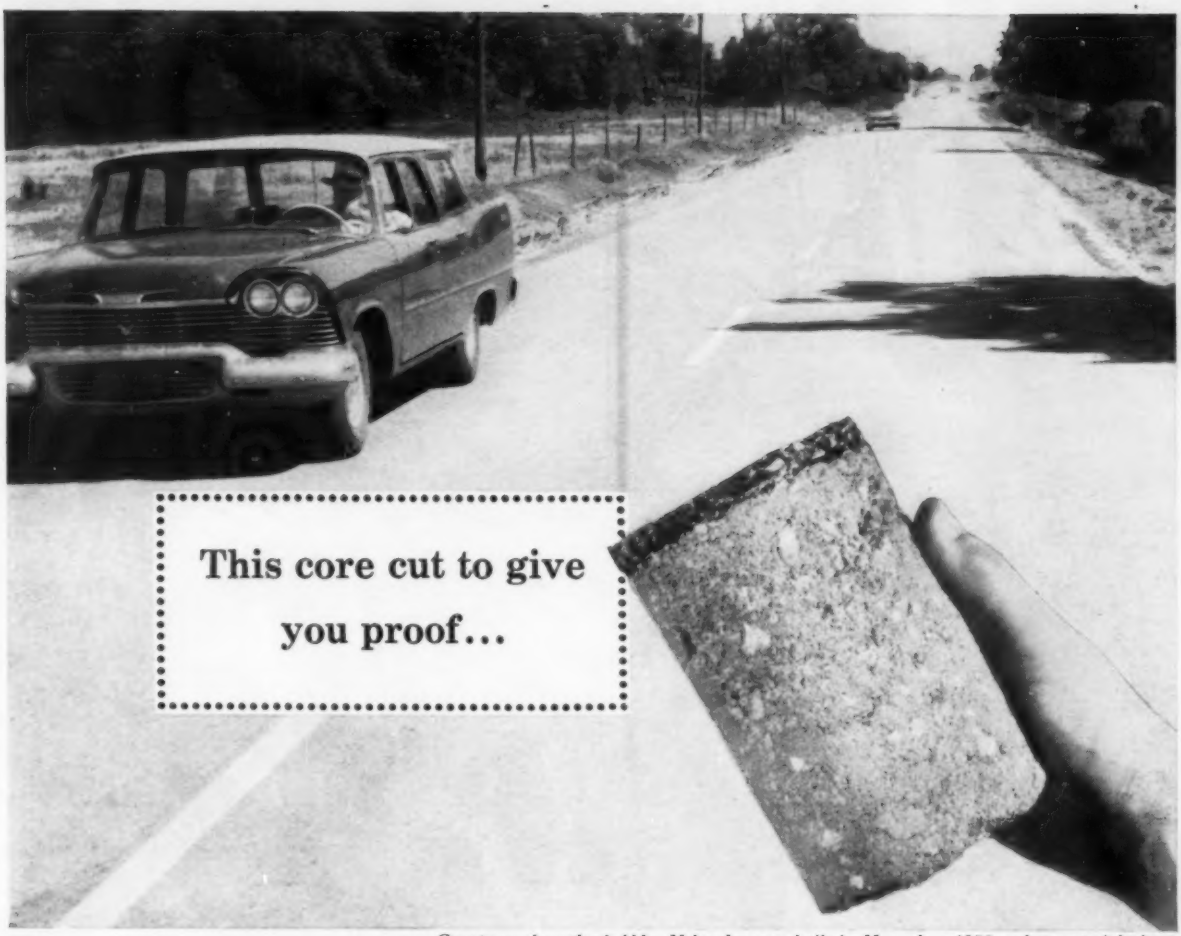
If you ask the job superintendent which crew has greatest need for the radio communication, he will, with little hesitation, single out the mechanic with his two field trucks.

"The very nature of the demands made on the repair and service crews indicate that many of the requests that come their way spell emergency. I think if I had to limit myself to one unit, I'd have that unit in one of our service trucks."

Contacting the mechanic in the fields presented a problem even with a radio in his truck, however. If he was working on a piece of equipment, he seldom could hear his radio.

To overcome this shortcoming, a speaker was mounted on the rear of the service truck cab. When the mechanic leaves his truck to work on equipment, he clips his switch on his receiver and his outside speaker keeps him in contact with the rest of the job.

The 40-ft. gooseneck looming over the lead vehicle in this photo actually is a conveyor belt structure housing a 24 in. wide belt that carries sand and aggregate to the cement mixer. This portable Erie Strayer batch plant can be off the road and in business in three hours, according to the company. Included among material supplied by B. F. Goodrich Company is 500 ft. of air hose needed to actuate air-operated equipment.



County road south of Alda, Nebraska, was built in November, 1958, using materials from the old gravel road and 6.5% cement. Core-tested in July of 1959, it registered 560 psi.

Pavement strength up 15% in 8 months on this Hall County, Nebraska, road

...soil-cement pavement grows stronger year by year!

Core tests show soil-cement gains strength from the first day it's laid . . . and keeps gaining in strength month after month!

Inch for inch, soil-cement is the strongest low-cost pavement. It provides beam strength that spreads traffic loads over the subgrade. It stays level and unrutted yet its initial cost is really low.

In fact, 75% of the materials are usually free. Soil, old gravel roads, or broken-up blacktop, can be the main ingredients. Just mix them with portland cement and water—roll solid, let harden, then top with a thin bituminous surface. Experienced crews using modern machines can lay up to two miles a day. And this is low-maintenance-cost pavement—it stretches road budgets, lets engineers plan ahead.

Soil-cement is the fastest-growing low-cost pavement for roads, streets, shoulders, subbases, airports and parking lots.

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of portland cement and concrete

MODERN
soil-cement

B.F.Goodrich helps unlock Ohio River traffic jam

WITH TIRES, HOSE AND OTHER PRODUCTS, B.F.GOODRICH SPEEDS CONSTRUCTION OF NEW NAVIGATION SYSTEM

Time was when traffic was slowed by 4 separate locks in a 95-mile stretch of the Ohio River. But the Capt. Anthony Meldahl Locks and Dam will flood them. This project is part of a modern navigation system that will reduce 13 locks and dams to 3, and lockage time from 19½ hours to 1½ hours.

Groves Ventures Company of Minneapolis, Minnesota, a joint venture sponsored by S. J. Groves & Sons Co., is on the job with an army of B.F.Goodrich tires and always-available BFG tire service. Rock Service tires, for example, haul 33-ton loads of concrete from batch plant to lock forms over rock-strewn roads. No problem for these BFG giants, though. They're available in new

33 TONS OF CONCRETE leave batch plant (photo at left) bound for lock pouring area (below). Locks will be 110′ x 1200′, will require over 670-thousand cubic yards of concrete, will cost over $25-million. B.F.Goodrich Rock Service and Rock Rib tires haul concrete 16 hours a day, 6 days a week down 2 long grades into the cofferdam excavation. Roads are covered with crushed rock and gravel, and often with 6″ of water. Yet BFG tires give exceptional service, Groves Ventures reports.

B.F.GOODRICH ON-THE-JOB TIRE SERVICE keeps Groves Ventures equipment rolling on lock project near Chilo, Ohio—keeps tire costs at a minimum. The BFG Servicemobile and repair shop are manned by tire experts, whose workmanship prompts Project Manager W. J. Green to write, "B.F.Goodrich service and repair facilities have done an excellent job of covering our needs."

NO STING IN THIS STEAM HOSE, used to cure concrete at Capt. Anthony Meldahl locks. It's Burstproof hose, made of BFG-developed heat-resistant rubber with layers of braided wire reinforcement. It can't explode. Supplying Groves Ventures with hose, belting and protective clothing—as well as tires—is all part of the BFG Unified Contractor Program. Contractors benefit from lower costs and better rubber products' service with this new BFG program.

Cut Protected compound that defies tire-killing rock.

B.F.Goodrich Flex-Rite Nylon cord construction withstands double the impact of ordinary materials, resists heat blowouts and flex breaks. Result: more retreadable tires. No wonder Groves Ventures specifies BFG tires.

You'll find B.F.Goodrich hose, protective clothing and other products at work here—all part of the BFG Unified Contractor Program that helps contractors cut costs and get better service from rubber products. Call your nearby B.F.Goodrich Smileage dealer (listed under Tires in the Yellow Pages). He has the know-how to help make your next contract more profitable. *The B.F.Goodrich Company, Akron 18, Ohio.*

Specify **B.F.Goodrich Tubeless or tube-type tires when ordering new equipment**

B.F.Goodrich

. . . for more details circle 304 on enclosed return postal card

Adjustable Forms Aid Beam Production

An example of the modern high production casting yard operations which are sparking the expansion of prestressed concrete use, is the plant here pictured. It is American-Marietta's plant at Lafayette, Indiana. A pipe producer for 30 years, the plant now also turns out bridge and building beams in its four 230-foot-long prestressing beds. Adjustable 10-ft. section steel forms (Blaw-Knox), a feature of one of the beds, help speed production of various sizes of box, ledger or haunched beams.

The plant began producing beams shortly after it became a division of American-Marietta late in 1957. Since 1951, A-M's various plants have supplied Amdek homes—in length to 113 ft.—for more than 1,000 spans.

Versatility of design led the Indiana plant operators to choose adjustable forms. They are used on one side of a double pretensioning bed, rated at 36,000 in.-lb. of tensioning force capacity (it can handle 500,000 lb. of stress 2 ft. above the soffit plate). Each of the parallel beds is serviced from a utilities trench equipped with compressed air, steam, and electric facilities station every 30 ft.

Box beams precast in the steel forms typically contain both reinforcing bars and from 29 to 50 strands of ⅜-in. high-tensile strength, stress-relieved cable. Strands are individually tensioned through use of a 15-ton hydraulic jack.

A 2 or 2½-in. slump concrete is employed to produce the prestressed beams at American-Marietta. Dense concrete is achieved through use of portable internal vibrators which eliminate air pockets. The concrete tests 4,000 psi in 12 to 18 hours.

The forms are usually in cast position 18 hours—although the hinged section could be moved in 4 or 5 hours. Tarpaulins cover concrete during the steam curing period. A crane moves the beam or beams from the form bed. Then excess prestress cable is burned off. Exposed cable end areas are coated with tar to prevent moisture from entering the beam.

The adjustable forms are positioned basically with a small tractor or lift truck. A tractor crane attachment lift forms in individual sections or combinations up to 30 ft. in length. One side of the forms is hinged, and positioned and fastened vertically with connecting pins—or at an angle, for beam removal, on flexible legs. The forms can be used without modification for various girder depths, or for production of ledger beams or beams having other cross-section dimensional combinations.

Final concrete placement is made within a short time of first pours for concrete uniformity within the beam. Vibration is done to eliminate air voids.

The hinged section of Blaw-Knox adjustable steel forms is shown positioned for concrete placement at American-Marietta's prestressed beam production line.

A 26-ton concrete beam is being hoisted from the forms by two 30-ton cranes. Next step: to trim excess prestress cable and apply protective tar over exposed cable ends.

← Dropping the first concrete to cover the prestress cables and form the bottom part of a hollow box girder. Inside box forms shown at left waiting setting

You can reduce your equipment investment because this D-120

pusher-dozer

can be converted into a tractor-shovel

Now you can buy a big, powerful rubber-tired tractor for bulldozing, push-loading or towing, with or without an optional package for converting the unit into a tractor-shovel.

This new D-120 PAYDOZER, in addition to its convertibility, has numerous engineering and design features which result in outstanding performance and ease of operation.

More power: Weighing 55,000 lbs., the D-120 is powered by a 300 hp. turbo-charged diesel which gives it a higher horsepower-to-weight ratio than other machines of similar size.

Better balance and stability: Approved and exclusive use of dry ballast in all four tires gives better weight distribution and lower center of gravity – dampens tire bounce and permits better blade control.

Inside push arms: Unlike crawler-mounted dozers, all rubber-tired units have push-arm brackets mounted on the main frame. The D-120 push-arms, however, are located inside front wheels, close to main frame for the most direct transfer of forces and the least strain. This also gives greater accessibility to the front wheels for hub and tire servicing.

"Full" power-shift transmission: Hough-built, this unit does not require stopping for range shifts. It is a full-reversing, constant-mesh type with four speed ranges, up to 26 mph., in both forward and reverse.

Matched torque converter: This is *not* a compromise converter for both dozer and shovel application. Instead it is designed specifically for bulldozing and makes fullest use of the tremendous engine power to develop maximum tractive effort. A torque-converter change is part of the bulldozer-to-shovel conversion package.

"Power-transfer" differentials: Provided on both axles for the best possible traction. When one wheel is capable of more tractive effort than the other on the same axle, it can automatically receive 38% more torque.

PAYDOZER is convertible to this H-120 PAYLOADER

"Three-way" power blade control: The D-120 blade is 12'-4" wide at the cutting edge and 4'-8" high. Adjustable from 1'-6" below grade to 3'-2" above; pitch adjustment of 35 degrees and blade tilt of 10 degrees on either side.

Hydraulic features: The system is closed and pressure-controlled to exclude air-borne dirt and foreign matter. Transmission and torque-converter oil is kept cool by a separate fan-cooled radiator.

Ease of operation: In addition to power-shift transmission there are twin hydraulic steering booster rams, and 4-wheel power air brakes with "Operator's-choice" brake controls – exclusive in its class. These dual foot pedals permit choice of braking with or without transmission engaged for any operating situation.

Standard equipment: Included are open-type cab, front and rear windshields and wipers, special lights and swinging draw-bar. Standard tires are 26.5 x 25 with 29.5 x 25 tires optional.

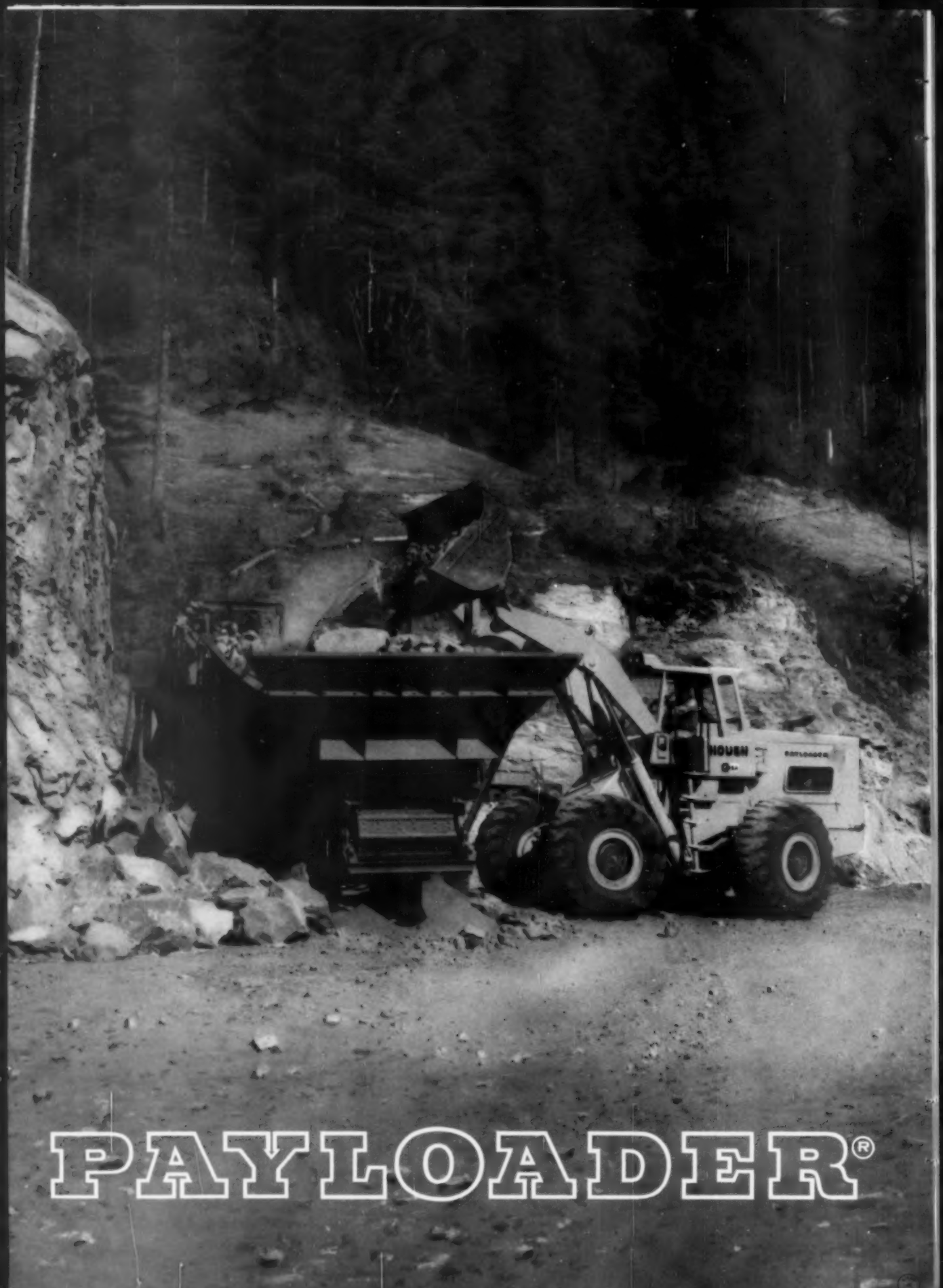
THE FRANK G. HOUGH CO.
768 Sunnyside Ave., Libertyville, Ill.
Send full data on the Model D-120 PAYDOZER
Name_____
Title_____
Company_____
Street_____
City_____ State_____
2-B-1

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY – INTERNATIONAL HARVESTER COMPANY
HOUGH, PAYLOADER, PAYMOVER, PAYLOGGER, PAYLOMATIC and PAY are registered trademark names of The Frank G. Hough Co.

HOUGH®

. . . for more details circle 308 on enclosed return postal card

HOUGH
PAYDOZER®



PAYLOADER®

Now the Model H-120 tractor-shovel is an even bigger value because it is

convertible

into the new D-120 PAYDOZER giving you two machines for about the price of one

The value of the H-120 PAYLOADER tractor-shovel, with its outstanding performance and productive capacity, is tremendously increased by an optional package which makes it possible to convert this tractor-shovel into a 'dozer.

Whenever seasonal conditions or any new projects dictate the need for 'dozer or pusher units, rather than loaders, these machines can be converted from one type to the other in a relatively easy and economical manner. Resulting benefits add up to greater flexibility and versatility while, at the same time, investment costs are almost halved.

The H-120 tractor-shovel is outstanding in many different ways. It has . . .

PAYLOADER is convertible to this D-120 PAYDOZER

More power than any other machine in this category with its 300 hp turbo-charged diesel engine. In addition, the torque-converter is engineered so that engine output is properly proportioned between traction and hydraulic requirements, and so that both these demands can be served simultaneously without engine lug-down.

More dumping clearance, and more dumping reach, than comparable units. It loads big trucks and railroad cars more evenly and easier – stockpiles higher.

Better balance and stability because of the exclusive use of extra-strong "T-1" steel for box section boom arms that saves over a ton of dead weight on the load-carrying end. The approved and exclusive use of dry ballast material in the rear tires lowers the center of gravity with 50% of the weight below the rear axle.

Distinctive boom design, forward and clear of the operator for greater safety. It features a single bucket-tilting ram and high-leverage linkage with tremendous breakout force – also simplicity and fewer parts, reducing wear and maintenance.

Hough-built full power-shift transmission of advanced design. It is a full reversing, constant-mesh type providing 4 gear ratios in each direction – requires *no stopping* for a "range" shift.

Easy operation because of power-shift, power-steer and 4-wheel power air brakes and "Operator's-choice" dual brake pedals. This feature, exclusive in its class, gives the operator the option of braking with or without the transmission engaged.

Many other features that mean better performance, lower maintenance and more value, such as: closed pressure-controlled hydraulic system; separate fan-cooled radiator to keep transmission-torque converter oil cool; torque-proportioning differentials in both axles; canopy-type cab with front and rear windshield wipers and special lights as standard. Bucket sizes are available from 3¼ to 8 cu. yd. (S. A. E. rated). Exclusive Drott 4-in-1 bucket can also be supplied.

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY – INTERNATIONAL HARVESTER COMPANY

HOUGH, PAYLOADER, PAYMOVER, PAYLOGGER, PAYLOMATIC and PAY are registered trademark names of The Frank G. Hough Co.

HOUGH®

THE FRANK G. HOUGH CO.
768 Sunnyside Ave., Libertyville, Ill.
Send full data on big Model H-120 PAYLOADER.

Name_____
Title_____
Company_____
Street_____
City_____ State_____

2-B-2

. . . for more details circle 309 on enclosed return postal card

New AASHO "Guide" Spells Out Job Procedures

Better inspection and documentation of jobs, chief target of new quality control guide for the state highway departments

Much that will concern contractors as well as engineers and administrators is packed away in a little green-covered booklet, just issued by the American Association of State Highway Officials. Entitled, "An Informational Guide on Project Procedures," the 62-page publication is the AASHO leaders' sum-up on the broad outlines of the quality control problem in the highway program.

The manual doesn't tell an inspector how to do his work, nor does it get into any of hundreds of "specifics" that must be handled daily in governing highway work. But it does draw a broad outline. The publication sets the stage for better quality control and work performance generally throughout the federal-aid highway program.

The purpose and scope of this statement are best described by reading its rather cumbersome subtitle: "A Guide for the Reviewing of Certain Administrative, Inspection, and Documentation Practices in use by State Highway Departments . . . With Particular Attention to Contract Construction, Pavement Type Selection and Right of Way Acquisition."

Ordered printed by the AASHO's Executive Committee as an information guide, the publication is the work of an AASHO special committee on project procedures, of which AASHO's 1960 president Stevens of Maine and vice president Bray of Kentucky were ex-officio chairman and vice chairman.

Publication of this guide was in anticipation of AASHO's annual meeting, held in Detroit around December 1. At this meeting an all-afternoon panel was held, at which much of the substance of this report was presented in the form of carefully prepared papers. Roads and Streets last month (January, 1961) carried highlights of several of the papers. Because of the importance of the thinking that is here crystallized, additional highlights are given on these pages. The complete publication is available to readers on request to the American Association of State Highway Officials, Room 917, National Press Building, Washington 4, D.C.

Seven subjects are each covered in a statement which is the work of a subcommittee: pavement type determination and documentation (chairman, Howard S. Ives, Connecticut); grading and minor structures (W. C. Williams, Oregon); flexible pavements (A. B. Cornthwaite, Virginia); rigid pavements (Rex M. Whitton, Missouri); channels of project supervision (D. C. Greer, Texas); bridges and structures (Glenn J. Paxson, Oregon); right-of-way (Robert L. Hyder, Missouri).

The problems of the state highway departments under an accelerated road program, notes the preface, are not so much engineering in character as administrative. This publication, issued in recognition of this, stems from a review of existing management procedures. It recommends added steps which could tighten quality control throughout every step of construction, and thus assure completion of projects to high engineering standards.

Emphasis is repeatedly given to the need for periodic checks and double-checks on performance, whatever the work being done and the supervision channels set up. Documentation and its importance are also underscored—in line with the Bureau of Public Roads' stepped-up procedures of requiring proof of materials and work quality in the files for federal-aid ABC and Interstate projects as a mandatory basis for project acceptance and reimbursement to the states for projects financed out.

The introduction suggests that the guide be used as a check list, in analyzing present procedures and correcting weak spots. The manual deals mostly with contract administration. Particularly it is aimed at helping set up effective lines of authority and responsibility in the field. It underscores the need for "meticulous and vigilant inspection procedures . . . and the necessity for a system of project investigation by officials at every level of responsibility."

The publication goes beyond construction contract work supervision, however, and encompasses other aspects of "highway quality." Its exact words: "The committee felt that the acquisition of rights-of-way, involving so many department representatives, independent

appraisers, property owners, unwilling sellers, occasional disgruntled speculators, court actions, misunderstandings, negotiations, and substantial amounts of public funds, is of sufficient moment to justify certain recommended procedures for this area. Because of the complexity of the right-of-way acquisition process, complete documentation of all actions and reasons therefore is absolutely essential."

Similarly the major matter of pavement type selection is covered, with recommended procedures that will insure full documentation of the steps and reasons involved in this important area of fund expenditure. The new publication is in no sense an engineering manual, the detailed technology and engineering for various work categories being considered satisfactorily outlined in existing ASSHO Manuals, Policies, and Standards.

As a final word in the introduction, the new publication calls for a review and where necessary a revitalization of three standard operating procedures:

1. A firm program of day-by-day, routine checks.
2. A practical system of periodic but unscheduled double checks.
3. A system of documentation of decisions, so that any authorized person could at a future date conduct an audit and determine the wisdom of various actions.

The highway departments, this chapter admonishes, must have sufficient competent personnel to properly administer its operations and control quality of work. There should usually be no need for "an unreasonable number of employes" to secure quality work, although this chapter warns against an overassignment of work load to project people.

Pre-Construction Briefings

Among the various recommendations under "Channels of Project Supervision," one is singled out here as being of top interest. That is the holding of pre-construction conferences. Such meetings are urged, with field people sitting in along with appropriate district and headquarters men. At such get-togethers the chief points in the project are gone over, and each person given a clear statement of his duties and responsibilities, work hours, frequency of inspection, tests, to whom the man reports, what constitutes proper reporting, which operations are subject to checking, what to do about unacceptable materials or work encountered, what's the answer when the contractor's equipment isn't satisfactory, etc., etc.

This kind of conference is declared particularly valuable for the type of man who might ordinarily not be prone to be a walking dictionary of the contents of all governing manuals and memoranda.

Pre-construction conference leaders should see that concise minutes are taken covering personnel instruction, delegation of responsibility to this or that individual, and related matters. Every man involved should be asked to initial a carbon copy, as certification that he has seen and read the minutes.

Another pre-construction conference should be held between the contractor's project representatives and the project engineer. Here the engineer should go over the specifications, unusual conditions, the contractor's plan and schedule of operation, and other pertinent items that will lead to a better job understanding. Both parties can then fix clearly in mind just who should communicate with whom during inspection. A utility representative should be present also if considerable utility work is involved in the job.

All important instructions to the contractor by the project engineer should be put in writing, or confirmed in writing, and be made part of the official project file. The project engineer should maintain a Progress Chart, showing major work items and their current status. Likewise, a complete Diary listing all major actions taken each day, official conversations, official visits and inspections, phone calls pertinent to the work, the make-up of the contractor's force on that day, work performed, weather and temperature, and use and disposition of state personnel. The Diary is cited as being of particular importance as a source of reference by visiting personnel or during any later audit or investigation.

Hop-skipping over some sections of the chapter on project supervision channels, the following further excerpts are presented also as being particularly basic:

Employe Morale

Morale of department people suffers when carelessness prevails. Ditto when unethical practices are allowed to develop, such as failure to resist political or contractor pressures. Morale is also hurt when men are assigned work for which they are not properly trained—a man in this position can hardly be expected to act with confidence during discussions with the contractor, or to fully understand his duties and the methods required to secure full compliance with specifications.

Another morale wrecker (see January Roads and Streets) is the failure of the boss to back the men in the field inspection force, when they have acted properly. The inspector's side should be fully heard and considered when controversies over contractor work arise. It takes only a few instances of pulling the rug out from under the inspector to destroy his confidence and his effectiveness. "Insistence that proper administrative practices be followed must be a continuing thing," the AASHO recommendations state. The word must come from the top of the organization. If top-level leadership fails, then apathy, laxity and inefficiency occur down the line.

"Integrity, confidence, interest in the work, and freedom from political interference must prevail at all levels of the department, if any procedure is to be satisfactory and in the public's interest."

Decision Making

Decision making is underscored as the most important element of administration. Executives at all levels should be encouraged to make decisions that come within their jurisdiction. Such decisions should be "through channels"—project men should not go over the heads of district men and directly to headquarters, for example. Such bypassing may leave an intermediate staff man unaware of a problem needing his attention. Also, field people should be encouraged to resist any tendency on the part of visiting headquarters men to give

direct instructions, when such should properly come from the district level.

Absolute Integrity

Absolute integrity on the part of all state highway personnel, this chapter goes on to say, is absolutely essential if public confidence in the departments is to be maintained. Excessive fraternization between department employees and contractor's key personnel must be discouraged.

Acceptance of gifts and favors from contractors and suppliers, even though the gift may appear trivial, "can create an unhealthy moral atmosphere that could adversely affect the public confidence and create a condition where more serious improprieties can occur."

Any case of dishonesty or serious conflict of interest found anywhere should result in the immediate dismissal of the person or persons involved. And the appropriate law enforcement agency should be notified by the department's chief administrative officer.

Solicitation or acceptance of a cash loan by a state highway employe from any contractor doing business with the department, or from any of the contractor's representatives, is cited as an example of a serious conflict of interest action. Where a state does not have sufficient laws to properly cope with such matters, it is suggested that the department, as a policy, require each employe to sign a statement that any proof of conflict of interest that could be interpreted as adversely influencing the ethical and proper discharge of his duties, will be cause for immediate dismissal.

Highway department employes, paid on an annual or monthly basis, should not engage in outside work, unless the matter is previously cleared by the chief administrative officer. Doing engineering work for and receiving compensation from the contractor should be prohibited. "It is incumbent upon the top management in the department," the report states, "to be on the alert for any indication of impropriety, and all ethical methods that might be indicated for checking into the conduct of employes should be used."

Pavement Evenness Control Starts at the Bottom

Excerpts from the chapter on Flexible Pavements in the new AASHO Project Procedures Information Guide:

Since the subgrade, or the top surface of the part of the earthwork constituting the roadbed, is the base for the flexible pavement structure, controls for a satisfactory flexible pavement must start at this point.

If the earthwork is completed as a portion of the project under way, it is assumed that it satisfactorily meets all the requirements as to compaction, line, grade and cross section. If constructed as a portion of a prior project, a complete inspection must be made under the direction of the Project Engineer to see that all of these requirements are satisfactory. If additional work must be done to provide an adequate subgrade and it is not provided for in the Project contract, then appropriate measures must be taken to either have it added to the contract or to have the work done by State highway department forces.

It is highly essential that the line, grade, and cross section of the subgrade are within specified limits, for it is highly impracticable to attempt to correct discrepancies in surface of the subgrade with the flexible pavement. If the subgrade is irregular, either in grade or cross section, the same characteristics will, to a large degree, be in evidence at the top of the completed flexible pavement and will seriously affect the riding quality and the performance.

After any repair work which might have been done on subgrade that was constructed as a part of a prior project, the Project Engineer should have density determinations made by trained personnel at the minimum rate of one per thousand linear feet per roadway width or such as is necessary to assure that the surface of the subgrade has adequate stability.

It is desirable that some check tests be made by personnel from the District or Headquarters Offices for the purpose of furnishing additional assurances that the subgrade is ready for placement of the flexible pavement.

After approved subbase or base material has been placed on an approved subgrade in sufficient depth to obtain the specified layer thickness and proper compactive effort has been applied, density tests, if required, should be made by competent Project personnel at the minimum rate of one per thousand linear feet per layer per lane width.

Reports of such tests should be placed in the project files where they can be reviewed by inspecting personnel from the District and Headquarters offices.

ARBA Convention Set for Atlantic City

The 1961 Annual Meeting of the American Road Builders Association will be held at the Chalfonte-Haddon Hall Hotel in Atlantic City, New Jersey, on March 5 through March 8.

This convention is considered of special significance because it will be held at a time when Congress is facing vital decisions on the progress and financing of the highway program. There will be a new administration from the Secretary of Commerce on down the policy making ladder. ARBA leaders urge that the people interested in the continuation of the highway program attend in numbers representative of the entire highway construction industry.

The ARBA particularly invites full contractor and associate support to bolster and add weight to the resolutions ann recommendations relating to the 1961 legislation.

How to stretch tax dollars . . .

breaker bar attachment provides greater pulverization to hard material

PETTIBONE WOOD PULVERIZER

Crushes in-place rock or asphaltic materials for low cost re-use

You can stretch tax dollars farther and complete jobs quicker with the PETTIBONE WOOD PULVERIZER . . . the only machine that scarifies and pulverizes old pavements, hard soils or rock in one operation!

The MODEL P-650 PULVERIZER takes up to a 6 to 8 inch cut compacted depth 6 feet wide per pass . . . and processes up to 1200 tons per hour. 12 inch maximum material crushed to 1½ inch minus.

In soil blending, the P-650 takes up to a 12 to 16 inch cut and prepares up to 1500 to 2000 cu. yds. per hour in blending with water to obtain high density.

Other features include: Self-contained Diesel engine for pulverizing (towed by a crawler tractor); low operating cost . . . tractor and pulverizer operator handle work normally requiring more equipment and manpower; accurate depth control with hydraulic jack; adjustable breaker bar and grids; adequate pulverization . . . material retained in pulverizer drum for a longer period for better breakage of the aggregate.

Pettibone Wood stabilization equipment is used for highway, airport and parking lot construction the world over. Write today for free job studies and your copy of "The A B C's of Soil-Cement Stabilization", an informative, 36 page booklet on stabilization techniques.

PETTIBONE
A SUBSIDIARY OF PETTIBONE MULLIKEN CORP
WOOD MFG. CO.

PETTIBONE WOOD MFG. CO.

P. O. BOX 620, NORTH HOLLYWOOD, CALIFORNIA

Originators of mix-in-place roadbuilding equipment

. . . for more details circle 348 on enclosed return postal card

100 TONS at 15′ RADIUS

makes the BEST *crane even* BETTER!

Now, with the new Manitowoc Model 3900, you get a *full 100-TON* lifting capacity at a practical *FIFTEEN FOOT RADIUS* with plenty of reserve power and stability. This means the 3900, already recognized in the field as the TOP lifting crane in its class, will lift 33% *more* than it did before. Check these new advances and see why a Model 3900 crane can make *more money* for you.

INCREASED LOAD CAPACITY AT GREATER RADIUS — With a 60-ft. boom, the 100-ton maximum load can be lifted at a radius of 15 feet.

NEW "INVERTED ANGLE" BOOM IS LIGHTER, STRONGER — Made of a special new alloy, the new Model 3900 crane boom features tubular lacings welded to *inner faces* of the main chords for greater strength and longer life. Boom weight is reduced, yet strength and rigidity are increased. You can use longer booms — up to 170′ — with higher capacities. Long reach tubular booms are also available.

SIMPLE BOOM INSERT CONNECTIONS with a single bolt at each joint permit fast in-the-field addition or removal of extra boom sections.

NEW 3-PIECE SELF-REMOVABLE COUNTERWEIGHT provides proper balance and ample stability. Carbody and rotating bed are matched to the demands of increased counterweighting and bigger work loads. As before, the counterweight is removed by the machine itself without the use of jacks, blocking or other cranes.

NEW "DYNAMIC LOAD CONTROL" DEVICE provides power lowering of full 100-ton load at lowering speeds comparable to hoisting speeds. The unit consists of a hydraulic retarder with heat exchanger, and a reversing mechanism with clutch and air controls. A chain drive interlocks main drum with the reversing mechanism which is located on the main drive shaft. The retarder, *not the engine*, absorbs load energy. Line speeds are controlled over a continuous range.

NEWLY ENGINEERED RETRACTABLE HIGH GANTRY reduces overhead clearance to a minimum when traveling. Gantry is quickly and easily raised or lowered by the boom hoist . . . no outside help is required.

NEW OUTSIDE POSITIONING OF CRAWLER DRIVE CHAIN permits crawler units to be removed for job-to-job transport without "breaking" drive chain or crawler pads. (Optional)

AUTOMATIC CLUTCH THROW-OUT LIMIT STOP for safe, close radius booming. This device *automatically* disengages boom hoist clutch when boom approaches a pre-set contact point . . . prevents operator from raising boom beyond safe limits. Also, physical-type pantograph boom stop is an additional safety feature.

INDEPENDENT BOOM HOIST IS STANDARD — has air controls to give the operator greater precision in handling boom and load. Operator has positive control at all times. Available on air-equipped machines only.

WIDE RANGE OF CONTROLS gives operating versatility. Available with air controls *only*, or manual controls *only*, or as a combination machine with *both* air and manual controls.

INDEPENDENT SWING is available as a useful feature for placing steel and "tight quarter" maneuvering. Allows operator to boom, swing, and travel simultaneously.

COMPACT DIMENSIONS for easier between-job shipment. The crane can be carried on standard railroad flat cars, within ordinary rail clearances . . . removing only crawler units, boom, and back hitch.

These new and improved features are only a small part of the complete 100-Ton Model 3900 crane story. To learn about the many other advantages you can enjoy, including full convertibility to dragline or clamshell, visit your nearby Manitowoc distributor soon.

MANITOWOC ENGINEERING CORP. 1 K
Manitowoc, Wisconsin Dept. R&S

Gentlemen: I'd like more information on your new 100-Ton Model 3900 crane.

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

MANITOWOC ENGINEERING CORP.
(A subsidiary of The Manitowoc Company, Inc.)
Manitowoc, Wisconsin

CRANES
25 to 125 TONS

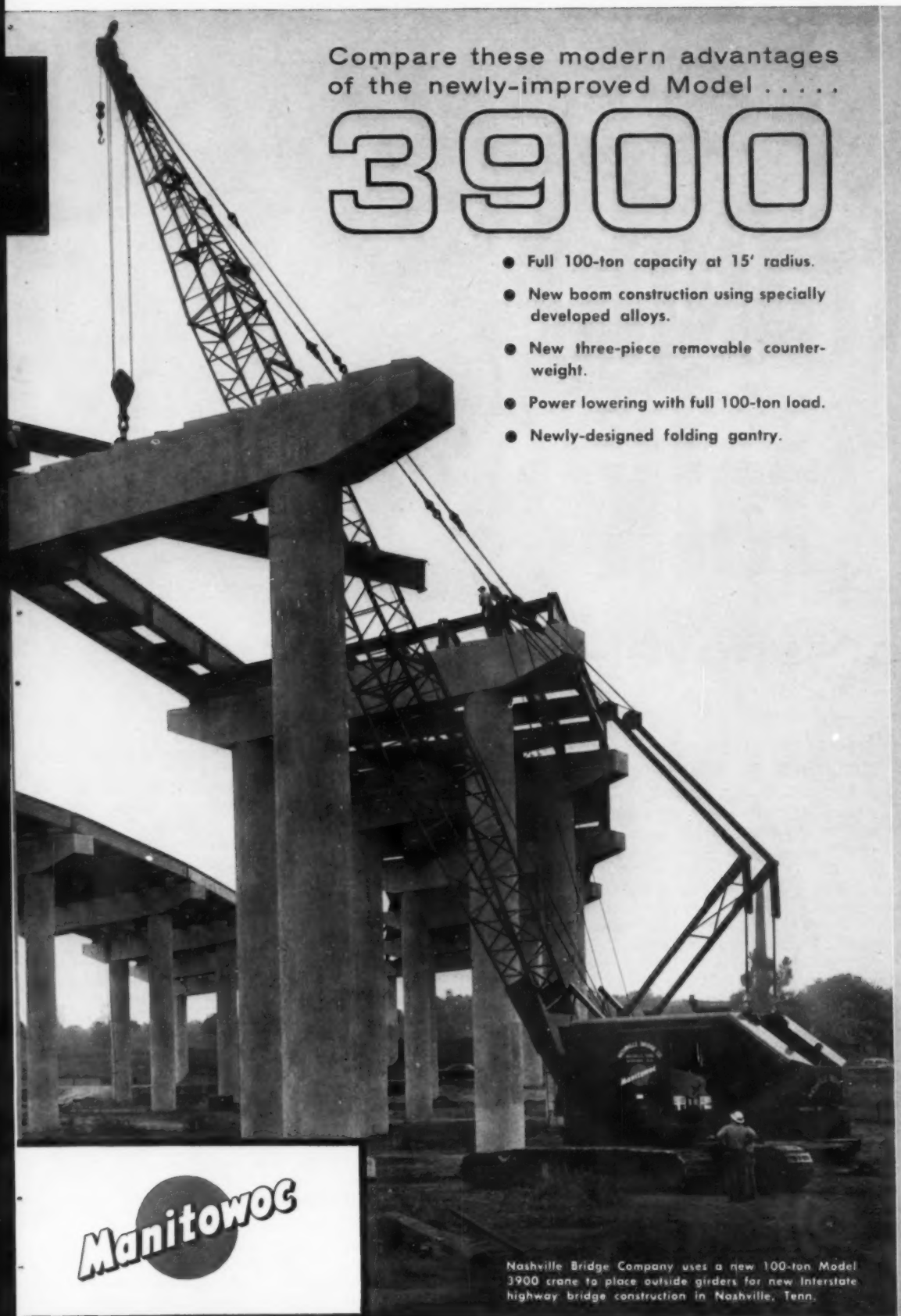
SHOVELS
1¼ to 6 YDS.

Compare these modern advantages of the newly-improved Model . . . . .

3900

- Full 100-ton capacity at 15' radius.
- New boom construction using specially developed alloys.
- New three-piece removable counterweight.
- Power lowering with full 100-ton load.
- Newly-designed folding gantry.

MANITOWOC



Nashville Bridge Company uses a new 100-ton Model 3900 crane to place outside girders for new Interstate highway bridge construction in Nashville, Tenn.

Manitowoc

. . . for more details circle 328 on enclosed return postal card

Straight talk

on shovel-crane controls

ONLY ONE SHOVEL-CRANE MAKER FULLY UTILIZES TRUE POWER-HYDRAULIC CONTROLS

Until recently, other shovel-crane builders completely ignored power-hydraulic controls, or were content to merely augment their outdated mechanical controls with booster-type systems — so-called "power" controls. Only in the last few years have some of these manufacturers begun to offer a power-hydraulic control, *though strictly on a limited basis* . . . not on all models and not for all machine functions. Some machines even employ 3 different control systems.

Now look at Link-Belt Speeder. The company first pioneered power-hydraulic controls for shovel-cranes in 1936, 25 years ago. Then, in 1954, Link-Belt Speeder made this modern, proven Speed-o-Matic system standard on every machine in its wide line. Today, the controls are used for every machine function . . . *are the same on each and every rig.*

JUST NUDGE THE LEVER

The years-ahead Speed-o-Matic system employs the instantaneous force of oil under pressure — all the way from the control levers to the operating clutches. And, since oil is noncompressible, clutches respond the instant additional pressure is metered into the clutch lines. Absolutely no wait for pressure to build up.

Short-throw Speed-o-Matic control levers are panel-mounted for operator convenience and ease. By simply nudging one or more of these levers, a crane operator, for example, can boom up or down, hoist or lower a load, swing, travel . . . independently or in suitable combinations. And every machine response is **instantaneous, oil-smooth, precise!**

For example, on a machine equipped with reversing clutch (or clutches) on the operating drums, the Speed-o-Matic operator can power down the heaviest or lightest loads with hairline accuracy. Fingertip-sensitive control levers provide exact in-hand feel of the load.

AIR CONTROLS TEND TO LAG

How many manufacturers actually *recommend* air controls for crane work . . . especially on the swing . . . or on the hoist, for that matter? Waiting for pressure to build up can be serious business, resulting in a dangerous lag. The operator cannot expect the same degree of precision and safety as with instantly responsive power hydraulics.

With the Speed-o-Matic system, hydraulic lines are constantly full of oil, permitting the operator to meter the desired pressure to the various clutches without the hazards of waiting for build-up. For *more pressure,* he merely eases the lever forward (or reverse). To *release,* he returns the lever to neutral.

AIR CONTROLS DEMAND EXTRA SERVICE

Air controls, for one, present their share of servicing headaches. Dirt and moisture prove a major worry . . . not to mention freezing, filter maintenance and other downtime annoyances. And most components of these systems are purchased from outside sources.

The Speed-o-Matic system, on the other hand, is

unaffected by normal changes in temperature or atmosphere, and requires only seasonal oil changes. It's an open system, *with no need to prime or bleed.* Basically it's the same reliable system used on aircraft. And all components of this modern system (except pump) are designed and manufactured by Link-Belt Speeder.

POWER-ASSISTED CONTROLS FALL SHORT

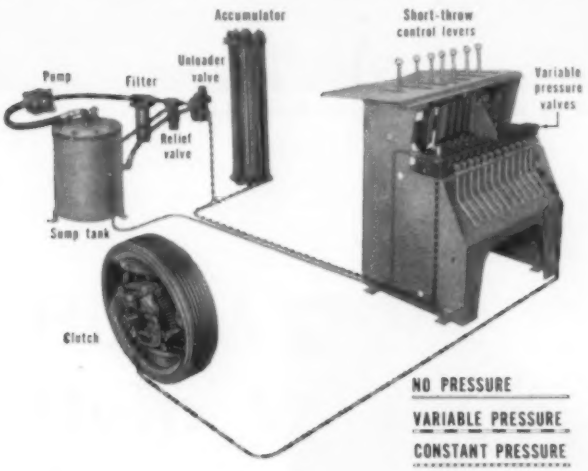
Manual hydraulic, air or mechanical booster systems offer a power assist to just a limited number of shovel-crane functions . . . **not all operations,** as with Speed-o-Matic. On some machines, to illustrate this point, only the main operating drums benefit from power controls, and on some mechanical booster systems, it is recommended that the booster be disengaged for crane work.

MECHANICAL CONTROLS DEPEND ON MUSCLE

Obsolete long-lever controls, of course, enjoy no power assist whatsoever. Still used on small machines, they are bulky and slow; they hand-fight the operator, contribute to his fatigue, hold down his production . . . require frequent adjusting. They simply do not compare to power controls.

SPEED-O-MATIC POWER-HYDRAULIC SYSTEM LETS OIL UNDER PRESSURE DO THE WORK

By means of variable pressure control valves, the operator meters oil pressure to each operating clutch. For more pressure, he lengthens the stroke of the lever to increase the force of the spring. This, in turn, moves the piston to admit more oil from the



valve bank. Response is prompt, positive and smooth. Pressure at the valve bank is kept constant (between 900 and 1050 psi) by the system's accumulator, which explains why the engine-driven pump operates against pressure only 5% of the time.

CLUTCHES SELF-ADJUSTING

Speed-o-Matic eliminates more than 150 working parts. There are no bushings, pins, links, clutch toggles. All actuating mechanism is oil-immersed. A micronic-type, replaceable oil filter keeps oil clean.

Interchangeable Speed-o-Matic clutches require far less operator attention. Even minor adjustments are spread weeks or months apart. Why? Hydraulic-actuated pistons automatically compensate for normal lining wear, heat expansion or temperature changes.

SPEED-O-MATIC CONTROLS MAKE EVERY JOB MORE PRECISE—FAR SAFER! This Link-Belt Speeder HC-98A truck-crane places forms, sets steel and pours concrete on high-reach assignments with pinpoint accuracy. Instantly responsive, Speed-o-Matic eliminates dangerous jump, jerk or lag.

PERFORMANCE AND PROFITS—A LONG-RANGE LOOK

Today, shovel-crane buyers simply cannot afford to relegate machine controls to secondary importance . . . cannot afford to buy experiments. A less efficient control system can penalize a rig in performance and profits for years to come.

See your local Link-Belt Speeder distributor for details, or write for illustrated literature. LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa. 108-60N

1936 - 1961 . . . 25th ANNIVERSARY OF SPEED-O-MATIC CONTROLS

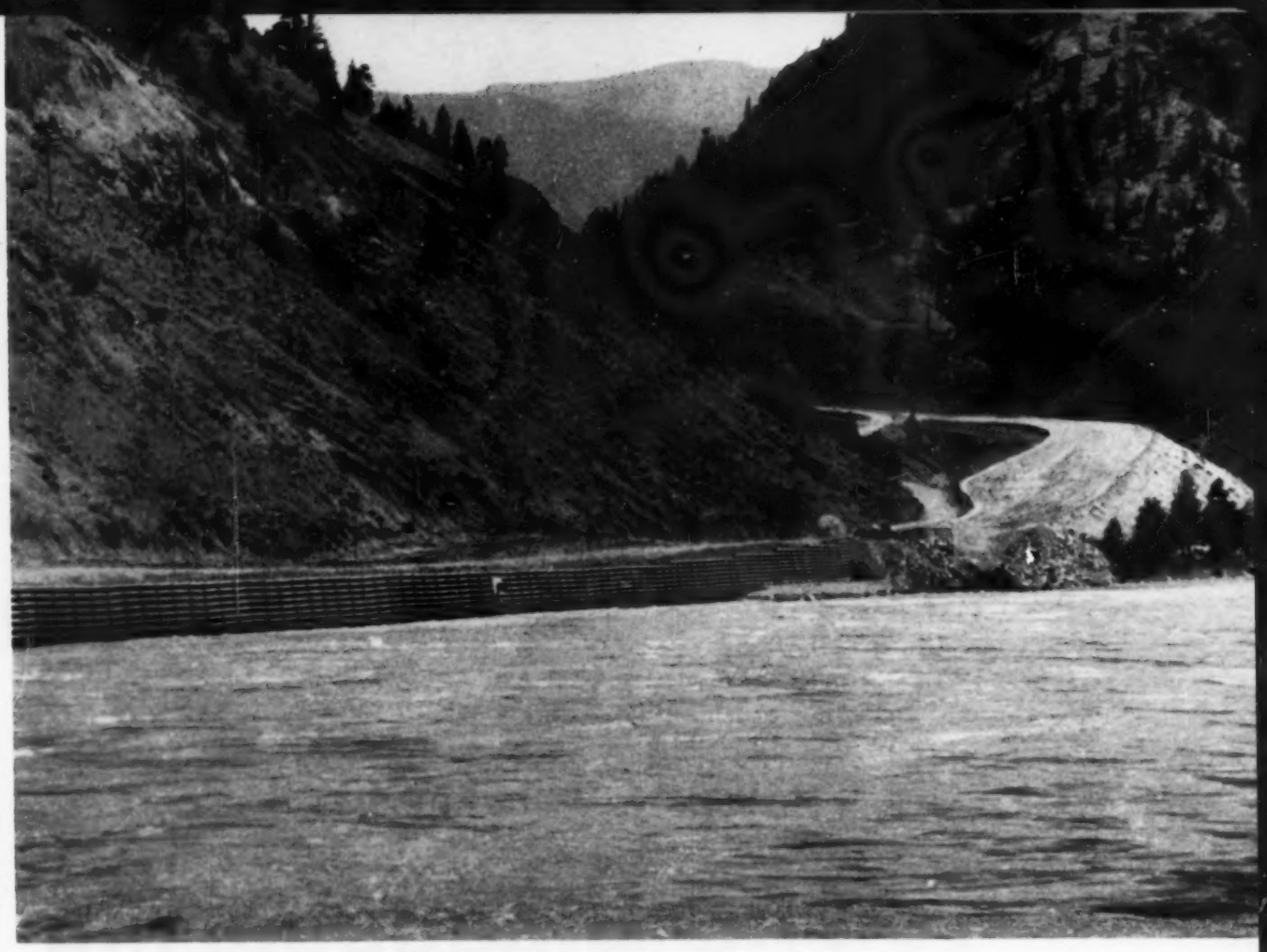
LINK-BELT SPEEDER

It's time to compare . . . with a Link-Belt Speeder

. . . for more details circle 322 on enclosed return postal card

The longest wall, more than 4,400 ft. on which work was halted by the rising Thompson River. Roadway seen immediately behind, and railroad line on high shelf.

Smaller bin-walls like this were used in many spots along the Thompson and Fraser Canyons where foundation was unstable and support was needed.



Bin Walls Help Win Canyon Space Battle

A highway and railway competed for almost non-existent space on a canyon wall. This was the problem faced by Canadian engineers in reconstructing the Trans-Canada Highway through the mountains between Hope and Spences Bridge, British Columbia.

The narrow roadway, built almost a century ago to open the gold fields of the Cariboo, had to be transformed into a modern highway.

From Spences Bridge to Tank Hill, the old road ran next to the river. The main line tracks of the Canadian National Railway were almost directly overhead along the canyon walls. Cutting into the slopes to widen the road would undermine the railroad tracks. Any expansion here, had to be toward the river.

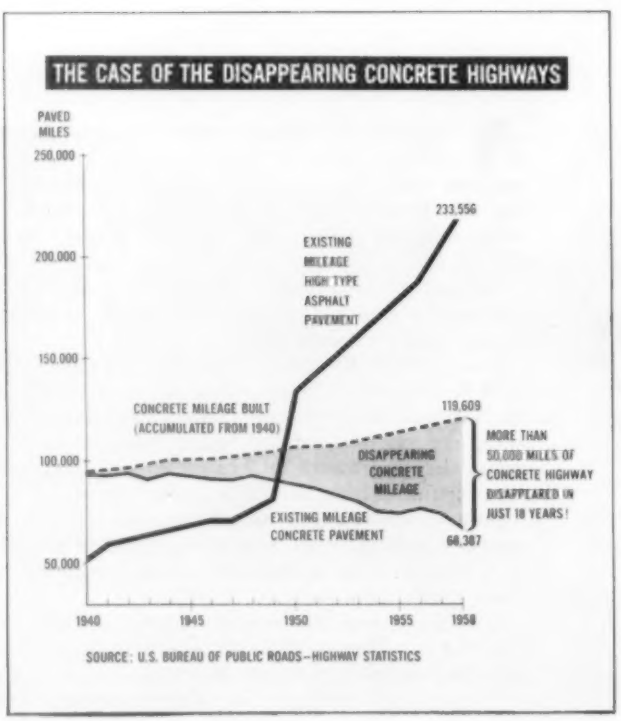
Because the riverbed foundation was unstable and costs of reaching a rock base were prohibitive, flexible steel bin-type wall construction was chosen to withstand earth shifts.

Construction of the longest Armco bin wall, 4,400 ft. along the Thompson River, was held up until late fall when the river was low. Workmen had to endure

Continued on page 113

ASPHALT presents the case of—

The Disappearing



Thousands of miles of expensive concrete roads have disappeared from view in the last 18 years. Most of these roads have had to be covered over with Asphalt paving to restore a satisfactory level of riding safety and comfort. How much better it would have been to use total Asphalt construction in the first place! Many millions in tax dollars would have been saved due to the more economical construction and lower maintenance costs of Deep Strength Asphalt pavements.

Concrete surfaced highways are actually disappearing from the records of the U.S. Bureau of Public Roads faster than they're being built. As this graph shows, from 1940 to 1958, despite the fact that more than 30,000 new miles of concrete roads were con-

EXPLANATION: Figures represent total mileages of high type Asphalt and concrete pavements built by State Highway Departments on state primary systems; municipal extensions to state primary systems and secondary and local roads built by State Highway Departments. See U.S. Bureau of Public Roads HIGHWAY STATISTICS—SUMMARY TO 1955 —table SMB-201 and tables SMB-2, 1956 to 1958 inclusive.

CONCRETE Highways!

structed, *total* concrete mileage *decreased* by over 50,000 miles. This is a decline in concrete mileage 9,000 miles greater than the entire new Interstate Highway System now being built.

During the same period, according to the Bureau of Public Roads records, high type Asphalt-paved mileage increased over 180 thousand miles. And today, over 90% of America's paved roads are Asphalt-surfaced.

One of the reasons for this is that each year the nation's petroleum industry invests over 4 million dollars in engineering research to keep Asphalt pavement the safest, most durable, economical pavement available.

NEW BOOKLET

Deep Strength Asphalt pavement can mean more miles of better roads for your tax dollar. To get the facts, read the new booklet, THE BETTER WAY TO BETTER ROADS. For your free copy, write The Asphalt Institute.

THIS IS AN EXAMPLE OF DEEP STRENGTH ASPHALT CONSTRUCTION

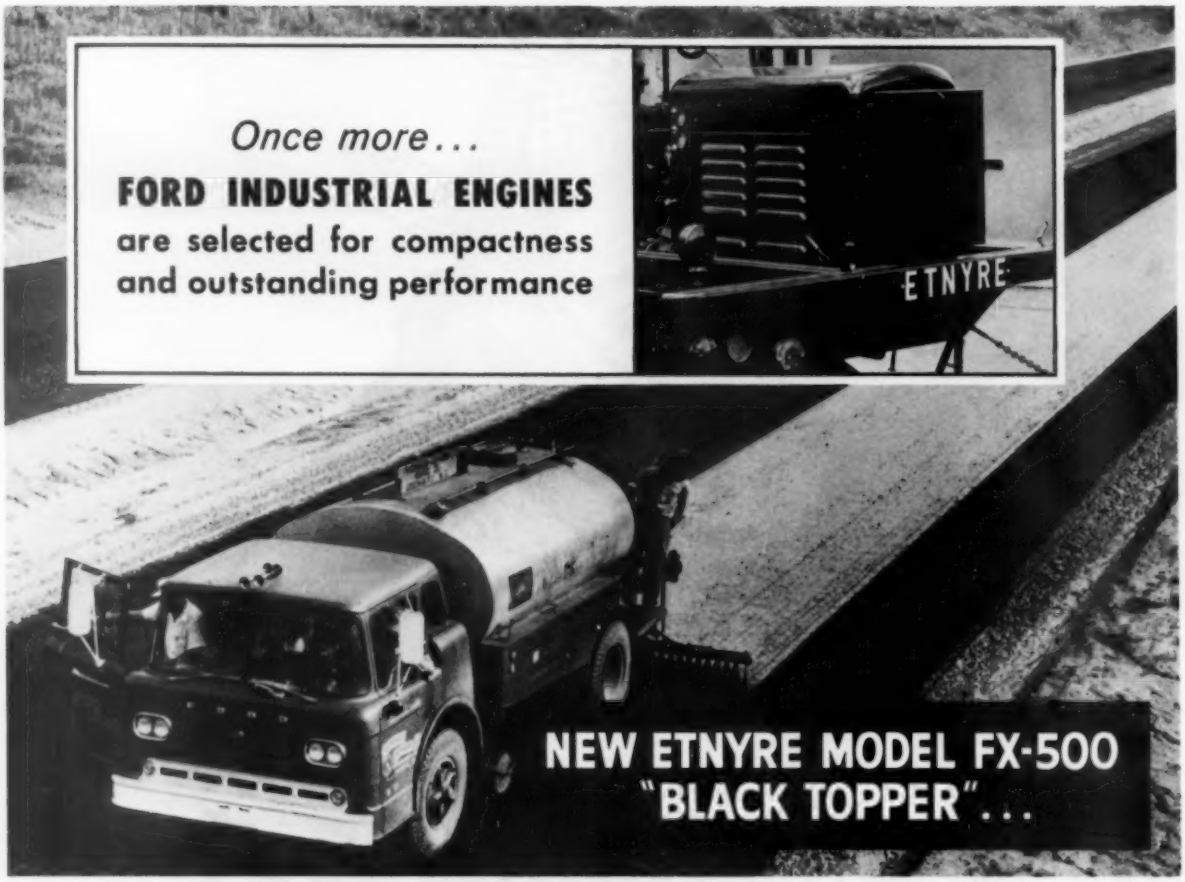
Its laminated, multi-layer, heavy-duty construction will outlast all other types of pavement, even those claiming to last 50 years or more.

And Deep Strength Asphalt construction has lower maintenance costs. De-icing salts don't harm the surface. There are no porous slabs to freeze and crumble. No sawed-in or built-in cracks to admit damaging moisture. No brittle slab to fracture even under the pounding of heaviest traffic—no lane joints to swerve your car.

A. 1½" Asphalt Surface Course. **B.** 2½" Asphalt Binder Course. **C.** 4" Asphalt Base Course. **D.** 6" Subbase Course with Asphalt Prime Coat. **E.** Subgrade Soil or Improved Subgrade.

The ASPHALT INSTITUTE

College Park, Maryland



designed for maximum payloads... and dependable, economical operation!

It's easy to see why Etnyre chose a Ford Industrial Engine for their FX-500 "Black Topper" . . . Ford engines deliver the kind of peak performance that construction work requires. Dependability and economy of operation are just *two* of the many advantages enjoyed by OEM's using Ford Industrial Engines. They're *compact* engines, allowing greater freedom of equipment design, and delivering *more horsepower per pound of engine weight than ever before possible!*

Parts and service availability is *immediate*, with a nationwide network of Ford Dealers carrying a complete stock of more commonly purchased engine parts.

Only Ford offers a full line of modern, overhead-valve design engines to meet every power requirement. Ford engines range from 134 to 534 cubic inches, including modern diesels. Most of these engines are available as foot- or skid-mounted power units. Whatever your industrial power need, it'll pay you to specify Ford Industrial Engines.

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED!

Ford
INDUSTRIAL ENGINES
AND POWER UNITS

INDUSTRIAL ENGINE DEPARTMENT, FORD DIVISION, FORD MOTOR CO., P.O. BOX 598, DEARBORN, MICH.

West of Rockies write to:
→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 6787, LOS ANGELES 22, CALIF.
→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 1666, RICHMOND, CALIF.

. . . for more details circle 299 on enclosed return postal card

Working in sub-zero weather construction crews are shown placing a pre-assembled bin partition.

CANYON BIN WALLS

Continued from page 109

20-below weather to erect 1,300 ft. of this massive wall before rising water halted construction. It was completed the next time the water was low.

Since the wall would be subjected to flood water heights of 15 ft., all the metal parts were supplied ready coated with a layer of asbestos imbedded in the zinc coating. In addition special analysis asphalt was applied over the asbestos-bonded panels in the bins to protect against sediment abrasion.

Each bin is 10 ft. wide, and the average height of the wall is 22 ft. Final backfill in the bins forms part of the road's subgrade.

At Tank Hill, again on the Thompson river, road and railroad change sides. The railroad runs next to the river. In many areas along this canyon section, costs of cutting into the mountains were prohibitively high, and the downhill foundation was weak. Again, a flexible wall was needed.

The longest flexible bin-wall used to support the highway above the railroad extends more than 2,000 ft. along the canyon wall. Average bin height is 20 ft.

Other shorter sections of bin-wall were spotted along the project where the foundation was unstable and support was necessary. In all, twelve walls were needed to bring the 24-mile stretch of Trans-Canada Highway through the Thompson Canyon up to required standards.

The contractor had all bin-wall partitions sub-assembled in one location, and then hauled the partly erected partitions, or transverse sections, to individual job sites. Final construction proceeded as fast as excavating crews could establish line and grade. Since there was no need for form work or curing time, work could proceed during sub-zero weather.

Modern Trailer Houses Diesel Plant

Two International UDT-817 engines, one of which is shown at left, powered Ready-Power 250-Kilowatt generators to operate this all-electric aggregate plant. The project is that of Rock Products, Inc., in the Balsam Gap (N.C.) area of Blue Ridge Parkway project, where the firm supplied 50,000 tons of base material. The Cedarapids crusher produces 1½ inch minus stone at rate of 2,000 tons per 9 hour day. Seen dumping is an International 65 Payhauler.

Continuously reinforced concrete pavement on this Maryland project embodies 0.6 percent steel, with all cross joints eliminated and 1 in. reduction effected in slab thickness.

Continuously Reinforced Concrete Paving Job

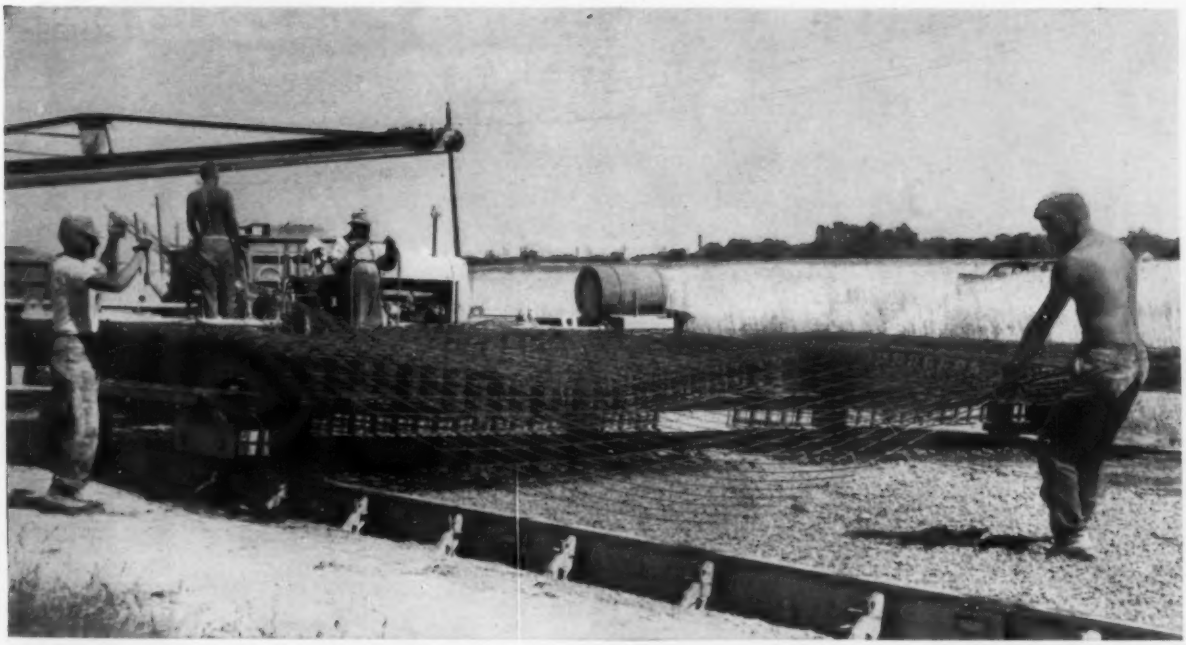
Paving work began late in the 1960 autumn on a 6½-mile gap remaining in the Baltimore-Harrisburg Expressway. Feature of this job, located near Cockeysville, Maryland, is 84,150 sq. yd. of continuous reinforced concrete containing heavy steel bar mats to control cracking.

Hundreds of visitors including engineers, contractors and state road officials from New England to Texas were expected to visit the project during the five weeks required for completion. The contractor is C. J. Langenfelder and Son, Inc., of Baltimore.

The 8″ x 25′ slab is continuously reinforced with 0.6 percent by volume of deformed steel bar mats furnished by Bethlehem Steel Company.

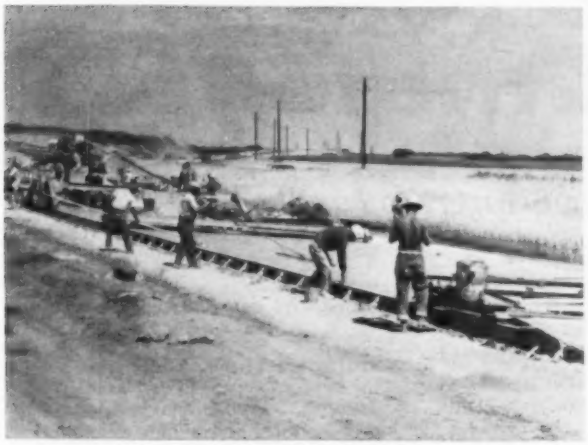
Continuous reinforced paving of this design is being watched with interest because it eliminates the need for the usual expansion and contraction joints. This continuity makes the pavement safer, smoother and quieter, according to a Bethlehem engineer. The deformed steel bar mats, up to 2½ times as heavy as used in ordinary distributed reinforcement, hold this pavement together even during wide temperature changes. Numerous traverse hairline cracks develop in a controlled, predictable pattern. These cracks do not impair the structural integrity of the road. They are so narrow that dirt and water cannot enter in large amounts and the motorist is completely unaware of them.

There is also 23,150 sq. yd. of conventional concrete pavement in this 6½-mile segment, designed for 9 in. thickness in contrast to the 8-in. continuous reinforced pavement. All conventional pavement is located adjacent to the five bridges already in place. Ramp paving is reinforced by welded wire fabric.



TRUSCON WELDED WIRE FABRIC

Shipped on Schedule Saves You Time and Money!



These highway construction scenes were taken on the job at Austin, Minnesota. Hallett Construction Company used Truscon Welded Wire Fabric the entire length of the job. Specify Truscon for your next project.

Truscon's new and enlarged fabricating facilities for Welded Wire Fabric have a tremendous production capacity and your shipping requirements can be met. The assurance that your reinforcing material will be on hand when needed, eliminates costly delays in waiting time and idle equipment.

Truscon Welded Wire Fabric is produced from cold drawn steel wire. New equipment assures uniformity of product from end-to-end. Provides built-in quality for predictable, dependable performance.

Truscon Welded Wire Fabric lies flat. Concrete flows on easily, works in evenly. Clings to the wire fabric surface. Sets up with strength distributed equally in four directions.

For further information, call your Truscon representative, or send coupon below.

REPUBLIC STEEL
TRUSCON DIVISION
Youngstown 1, Ohio
NAMES YOU CAN BUILD ON

REPUBLIC STEEL CORPORATION
TRUSCON DIVISION • DEPT. A-1307-A
1102 ALBERT STREET • YOUNGSTOWN 1, OHIO

Please tell me more about the advantages and economies of using Truscon Welded Wire Fabric.

Name _____ Title _____

Firm _____

Address _____

City _____ Zone ____ State _____

. . . for more details circle 334 on enclosed return postal card

On one job: 20 different materials

Contractor slashes costs by using Scrapers to handle all of them. The make: Michigan.

Fine sand. Gravel. Silt. Clay. Gumbo. Shale. Slate. Three soil types with a CBR under 5.0. Twenty kinds of material in all.

A real test for any scraper fleet, you'll certainly agree.

It all took place *in one 5 mile road contract*—a relocation of U.S. 31W through the hilly river-valley "Knob" country of northern Kentucky. The dirtmover—Ferguson Contracting Company, Princeton. Their fleet—a matched quartet of 262 hp Michigans: one Model 280 Tractor Dozer for push-loading, three 19-yd Model 210 Tractor Scrapers *for all dirtmoving!*

Output in wet clay: 500 pay yds hourly

Work started in unusually wet weather—4½ inches of rain *more* the first month than normal, according to Weather Bureau statistics. First, under these conditions, the machines stripped topsoil. Then on they went to the first cut—containing a type of clay. Loads averaged 14 pay yds each . . . load time, about 40 seconds. According to time studies made by Tom Ferguson, company president, each of his three Michigan Scrapers, on typical 3000 ft cycles, delivered 12 loads per hour. Production averaged 4,000 pay yds per 8-hour shift . . . a tribute partly to the Michigan Dozer's fast loading speed, 5 to 7 mph . . . partly to the Dozer's fast backup, 8 to 10 mph. *And the Michigan Scrapers, with their power shift and torque converter providing maximum speed on the grades, often hauled in fourth gear (up to 31½ mph).*

Michigans overcome many problems including in-place loading of shale

Later in the 280,000 yd job, a number of interesting problems were overcome.

One involved the slate and shale—materials which often require blasting. But even here, Michigan Dozer-Scraper power and traction permitted effective in-place loading.

At another point, when material was pure clay, the sun shone long enough to completely dry things out. Every pass created clouds of dust. To the Michigan operators it meant little difference, however. Michigan cockpits, 7½ ft above ground level, kept them above most of the dirt.

With rear-wheel steer, Michigan Dozer has full power even when turning.

With Michigan power-shift, operators never need slow down to change gears. Result: maximum speed on hilly haul cycles.

Also handle fine sand

In another cut, predominately oozing plastic clay, a 40 ft wide by 550 ft long vein of highly absorbent powdery sand was encountered. The task was to bring the cut down to grade; then figure a way to build some sort of drain which would prevent water from accumulating and undermining the finished highway. This problem was licked by removing the clay and undercutting the sandy section by about two feet—then cutting a drain trench down the center and an outlet finger to the outside of the berm. To finish the job, the drains were filled with No. 3 crushed stone and the entire area filled back to grade with high-grade borrow. All this work, including cutting and shaping the ditches, was handled by the Michigan Tractor Dozer and Scrapers. Practically no production time was lost, since this drainage project could be done when state inspectors considered other areas too wet to work.

Owners like Michigan "power, speed, ease of operation"

Michigan "power and speed" were two important factors in turning back what could have been "job-busting" problems, according to the Ferguson executives.

Project Supt Ray Cardwell reports additionally that the "ease with which new operators learned to handle the power-shifted, power-steered Michigans" also "contributed heavily" to the success of the job. So too did Michigan ease of maintenance, dependability, and the good service from distributor Rudd Construction Equipment Co of Louisville.

YOUR Michigan distributor will be glad to show you these machines in action so you can judge their advantages for yourself. Four Dozers, 162 to 600 hp; three Scrapers, 10½ to 29 yds, to choose from.

Michigan is a registered trademark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division

CLARK® EQUIPMENT

2497 Pipestone Plant
Benton Harbor 37, Michigan

In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario

. . . for more details circle 290 on enclosed return postal card

HOURLY EQUIPMENT COSTS

Continued from page 57

unwise to attempt to include the effect of wages in the analyses that are presented hereafter.

Since the methods of calculating the cost of depreciation vary with contractors, two plans are analyzed, under Conditions 1 and 2. Other conditions could apply equally well.

Condition 1.

Under this condition the owner will use the equipment for five years, then trade it in on new equipment, regardless of the number of hours that it has been used. Under such conditions experience shows that the salvage value of the equipment is based on its age in years. Thus, the extent that equipment is used has little, if any effect on its salvage value. For this condition, depreciation is a function of time only.

Consider the cost of owning and operating a 225-hp crawler tractor, equipped with a bulldozer. The initial cost, which includes freight and taxes, and the salvage value, are adjusted to reflect actual cost and value, rather than list prices. Depreciation is calculated by the straight-line method.

Delivered cost	$36,600
Less salvage value after 5 years	4,600
Amount to be depreciated	$32,000

Determine the cost per hour to own and operate this tractor, based on a useful life of five years at 2,000 per year, for a total life of 10,000 hours, excluding the operator's wages.

Cost Per Hour:

Fixed cost:	
Depreciation, $32,000 ÷ 10,000 hr	$ 3.20
Interest, insurance, taxes, storage	1.43
Semi-total, fixed cost	$ 4.63
Operating cost:	
Repairs, 100% of $36,600 ÷ 10,000 hr	$ 3.66
Fuel, 11 gal @ $0.14	1.54
Oil, grease, filters, installed	0.44
Semi-total, operating cost	$ 5.64
Total cost per hour	$10.27

If the tractor is used 2,000 hours per year, the above cost should be correct. However, if it is used less than 2,000 hours per year, the fixed cost, namely $4.63 per hour, will continue for every hour that it is used less than 2,000 hours. The difference between 2,000 hours and the actual time that the equipment is used during a year is defined here as idle time. For example, if equipment is used 1,500 hours per year, it is considered to be idle 500 hours per year. When equipment is idle, especially for a long period of time, there may be a small cost for maintenance, repairs, and servicing, covering such items as deterioration of hose and fan belts, servicing the fuel injector, and running the engine periodically to keep it in operating condition. Assume that the combined cost of these items amounts to 10 percent of the nominal cost of repairs during operating hours. Then the cost for each idle hour, as previously defined, will be as follows:

Cost Per Hour When Equipment Is Idle:	
Fixed cost	$4.63
Maintenance and repairs, 10% of $3.66	0.37
Total cost per hour	$5.00

If the tractor is used more than 2,000 hours per year, there should be no fixed cost for those hours in excess of 2,000 hours. Thus, the cost per hour will be as follows:

Cost For Each Hour Operated In Excess Of 2,000 Hours Per Year:	
Fixed cost	$ 0
Operating cost	5.64
Total cost per hour	$5.64

Using the three total costs per hour previously calculated, let us determine the actual costs per operating hour when the tractor is operated less than, or more than, 2,000 hours per year. If the tractor is operated less than 2,000 hours per year, the total annual cost of idle time must be added to the total annual operating cost if all costs incurred during a year are to be recovered. For example, if the tractor is operated only 500 hours per year, it will be idle 1,500 hours. The cost of this idle time must be recovered by charging an increased rate for the 500 hours that it is operated, using the method presented hereafter. Representative costs per operating hours are calculated as follows, with the indicated times representing the actual hours of operation per year:

500 Hours	
Operating hours, 500 × $10.27	$ 5,135
Idle hours, 1,500 × $5.00	7,500
Total annual cost	$12,635
Cost per operating hour, $12,635 ÷ 500	$25.27
1,000 Hours	
Operating hours, 1,000 × $10.27	$10,270
Idle hours, 1,000 × $5.00	5,000
Total annual cost	$15,270
Cost per operating hour, $15,270 ÷ 1,000	$15.27
2,000 Hours	$10.27
3,000 Hours	
Nominal hours, 2,000 × $10.27	$20,540
Excess hours, 1,000 × $5.64	5,640
Total annual cost	$26,180
Cost per operating hour, $26,180 ÷ 3,000	$8.73

Table 1 gives the cost per operating hour for selected hours of operation per year. Column 3 gives the ratio of the cost per operating hour, divided by

Table 1
Cost of Owning and Operating a Tractor, for Condition 1

Hours operated per year	Cost per operating hour	Cost per hr Ratio	Cost for 2,000 hr
500	$25.27		2.46
1,000	15.27		1.49
1,500	11.94		1.16
2,000	10.27		1.00
2,500	9.34		0.91
3,000	8.73		0.85
4,000	7.95		0.77
5,000	7.49		0.73
6,000	7.18		0.70

Table 2
Cost of Owning and Operating a Tractor, for Condition 2

Hours operated per year	Cost per operating hour	Cost per hr Ratio	Cost for 2,000 hr
500	$20.47		2.00
1,000	13.67		1.33
1,500	11.40		1.11
2,000	10.27		1.00
2,500	9.66		0.94
3,000	9.26		0.90
4,000	8.76		0.85
5,000	8.45		0.82
6,000	8.25		0.80

the cost per hour for 2,000 hours of operation per year. Thus, if the tractor is operated 1,000 hours per year, the cost per operating hour will be 1.49 times the cost for 2,000 hours per year. Figure 1 shows the same information as curves, using rectangular coordinates.

The costs previously calculated will apply for a tractor that is used for normal operations, such as push-loading scrapers, dozing earth and loose rock, etc. However, if the tractor is used to rip rock, the cost per hour for maintenance and repairs should be increased by at least 50 percent for those hours that it is actually operated. If this cost is increased by 50 percent, the three costs previously developed would be modified to the following values:

Item	Cost per hour
Operating 2,000 hours per year	$11.60
Idle time	5.00
Time in excess of 2,000 hours per year	6.97

Condition 2.

Rather than dispose of equipment after using it five years, some owners continue to use it as long as it will give satisfactory service. For these owners the equipment will lose value at a lower rate when it is idle than when it is operating. Thus, full depreciation should not be charged for idle time. By the same reasoning, there will be additional depreciation during those hours in excess of 2,000 hours per year. Perhaps a reasonable depreciation cost would be calculated at a rate equal to 50 percent of the rate for 2,000 hours per year, for idle hours, and for the time it is operated in excess of 2,000 hours per year. If this assumption applies, the cost per operating hour should be as calculated hereafter for the specified hours of operation.

Cost Per Hour When Operated 2,000 Hours Per Year:	
Total cost per hour the same as for Condition 1	$10.27
Cost Per Hour When Equipment Is Idle:	
Depreciation, 50% of $3.20	$1.60
Interest, insurance, taxes, and storage	1.43
Maintenance and repairs	$0.37
Total cost per hour	$3.40

Table 3
Profits or Losses Resulting from Variations in the Time Equipment, for Condition 2

Hours operated per year	Annual cost	Amount recovered	Annual profit or loss
500	$12,635	$ 5,135	$ 7,500 L
1,000	15,270	10,270	5,000 L
1,500	17,910	15,405	2,505 L
2,000	20,540	20,540	0
2,500	23,350	25,675	2,325 P
3,000	26,190	30,810	4,620 P
4,000	31,800	41,080	9,280 P
5,000	37,450	51,350	13,900 P
6,000	43,080	61,620	18,540 P

L designates a loss
P designates a profit resulting from extra use only

Cost For Each Hour Operated In Excess Of 2,000 Hours Per Year:	
Depreciation, 50% of $3.20	$1.60
Interest, insurance, taxes, storage	0
Operating cost	5.64
Total cost per hour	$7.24

Based on using these rates, the cost per operating hour will be calculated as follows, with the indicated time representing the hours of operation per year:

500 Hours

Operating hours, 500 × $10.27	$5,135
Idle hours, 1,500 × $3.40	5,100
Total annual cost	$10,235
Cost per operating hour, $10,235 ÷ 500	$20.47

3,000 Hours

Nominal hours, 2,000 × $10.27	$20,540
Excess hours, 1,000 × $7.24	7,240
Total annual cost	$27,780
Cost per operating hour, $27,780 ÷ 3,000	$9.26

Table 2 gives the cost per operating hour for selected hours of operation per year for Condition 2. Figure 2 shows the same information in curve form.

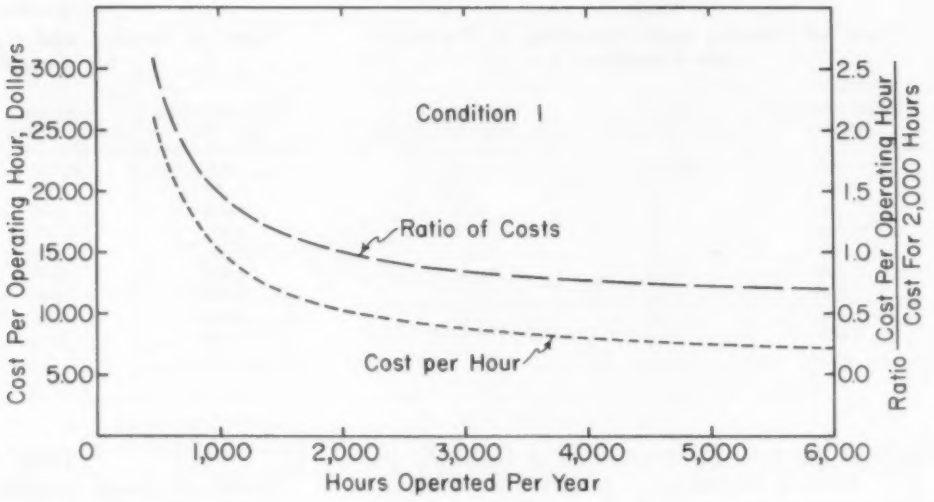


Figure 1. Cost per operating hour for Condition 1 (Table 1 shows same data in tabular form).

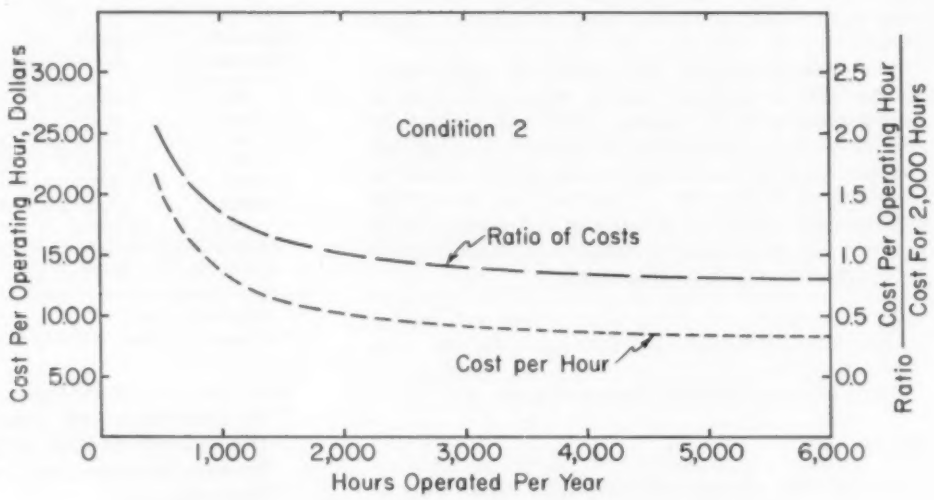


Figure 2. Data for Condition 2 plotted as in curve form.

An examination of the curves in Figures 1 and 2 reveals that as the operating time for equipment drops below 2,000 hours per year, the cost per hour to own and operate the equipment increases quite rapidly, and at an increasing rate as the operating time decreases. While the cost per hour decreases as the operating time increases above 2,000 hours per year, the rate of decrease is relatively small, compared with the rate of increase for the opposite condition.

Thus, the possibility that equipment will be used less than 2,000 hours per year can be quite critical, and should be considered fully, and if there is a definite possibility that such may occur on a project, the bid for the project should include a provision for this increased cost.

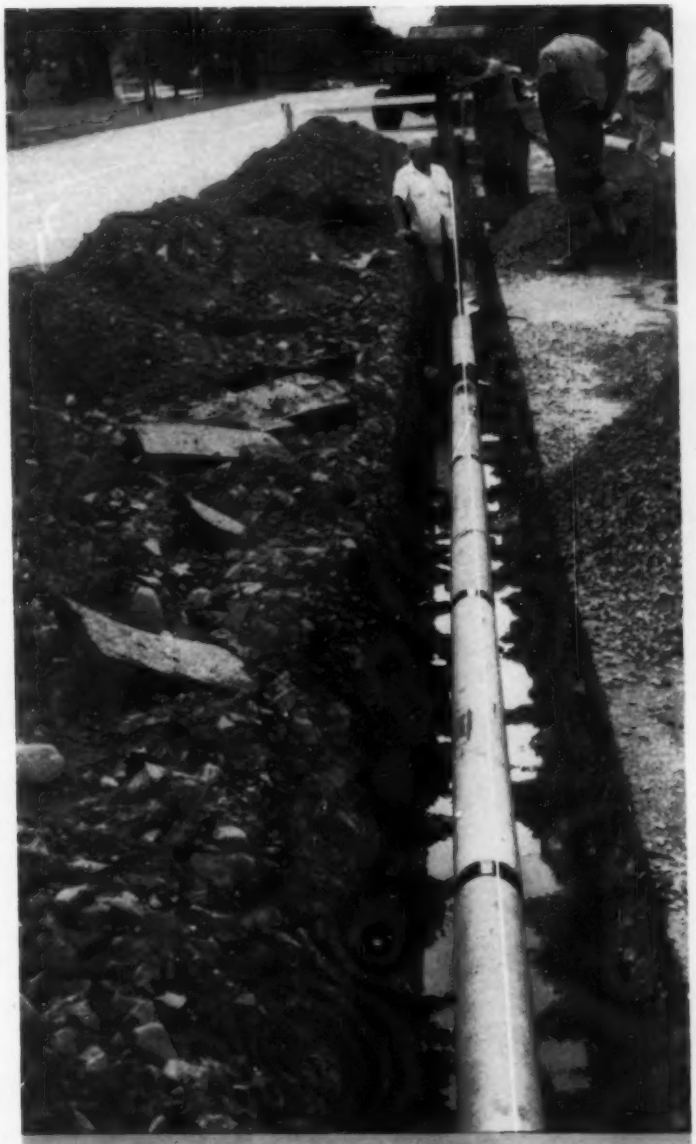
This should be done by increasing the hourly cost to that which applies for the anticipated time that the equipment will be used.

If it is assumed that the tractor, whose cost per hour is given in Table 1 and Figure 1, will be used 2,000 hours per year, the anticipated annual cost will be 2,000 × \$10.27 = \$20,540, excluding wages to the operator. This cost will be recovered if the equipment is actually operated 2,000 hours per year. However, if the equipment is used only 1,000 hours per year, the amount recovered will be \$10,270, whereas the cost will be 1,000 × \$15.27 = \$15,270. This will produce a loss from this cause only equal to \$5,000.

Table 3 shows the losses or profits resulting from variations in equipment costs with hours of use, if the equipment cost is assumed to be \$10.27, when the operating time is less than or more than 2,000 hours per year. The information in the table is based on Condition 1.

Thus, it is imperative that a contractor who experiences or anticipates idle equipment time include a contingency in his bid, or that he increase the hourly cost of equipment in his estimate, if he is to forestall a loss when his equipment is excessively idle because of weather or for any other reason.

The amount by which he should increase the hourly cost for a given or assumed number of hours of use per year can be obtained from Column 3 of Table 1 or 2, depending on which table more nearly applies to his equipment conditions. If neither of these tables applies, he can prepare one that does apply, and use it.



NEW!

for subsurface drainage...

TRANSITE UNDERDRAIN PIPE

- **Extremely good weight-strength ratio**
- **Naturally smooth interior**
- **Resists corrosion**
- **Assures low frictional resistance to flow**
- **Excellent alignment, tight joints, low material cost for new installation economies**

For highways, airports, dams, industrial plant sites—anywhere there's a subsurface drainage job to be done—Johns-Manville Transite® Underdrain Pipe does it effectively and economically.

The plastic coupling used with Transite Underdrain Pipe assures a permanently tight, *flexible* joint . . . keeps out waterborne silt and maintains permanent pipe alignment. And, because of Transite's long (10 ft. and 13 ft.) lengths, fewer joints are needed in the line.

Made of tough, durable asbestos and cement, Transite Underdrain Pipe won't rust. Its interior is made smooth to stay smooth, assisting the flow of water and reducing the opportunity for solids to find a resting place in the line. As a result, the perforations are able to perform their function of permitting entry of ground water into the line , at a maximum rate, where it can be quickly carried off.

Transite's low material cost, installation and maintenance economies mean important savings from the time it is specified until there is no longer a need for the line. Let us send you, without obligation, our book TR-246A. Write Johns-Manville, Box 14 (RS-2), New York 16, N. Y.

SECTION THRU HOLES

The minimum crushing strengths* of Transite Underdrain Pipe for subsurface drainage systems are shown in the following table:

PIPE SIZE (inches)	TOTAL APPLIED LOAD PER LINEAL FT. (pounds)	PIPE LENGTH (Feet)
6	1,000	10
8	1,000	10
10	1,100	13
12	1,200	13

*A.S.T.M. 3-edge bearing method
A complete line of fittings is available including elbows, tees, wyes, crosses, end caps and increasers.

JM

JOHNS-MANVILLE

. . . for more details circle 315 on enclosed return postal card

1 One man on spreader lays base for mesh.

2 One man on spreader-finisher lays top and also finishes it with first screed.

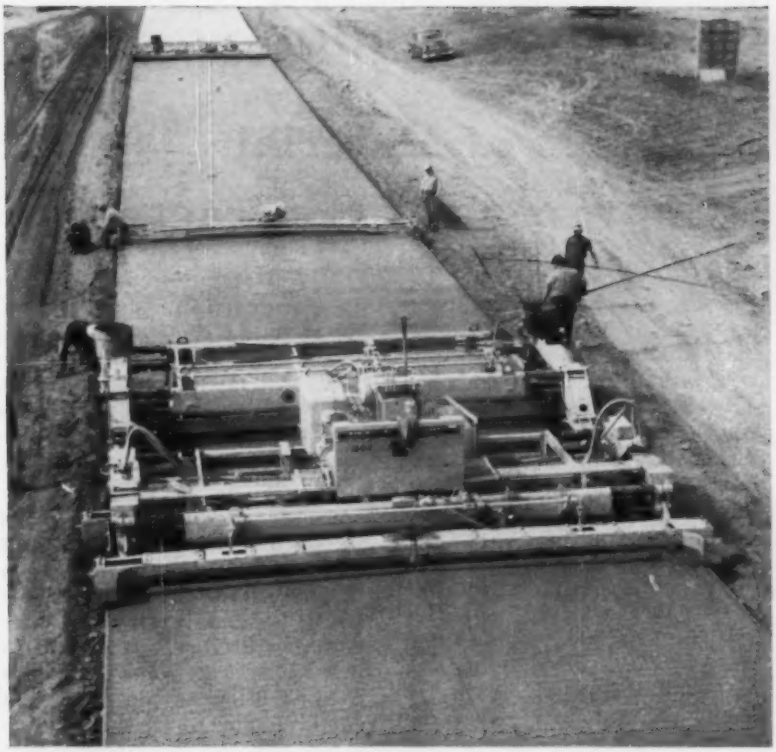
3 One man on finisher, gives accurate finish with tandem screeds.

This same man also operates the finisher-float towed behind the finishing machine for final close-tolerance correction with suspended oscillating screed and 30″ wide float pan.

4 Three men (one for each side and the third with full-width lute) edge and complete the surface.

5 Burlap drag requires no operator.

6 Last man applies curing compound.



THE MACHINES DO THE WORK: Top course has already been spread, struck off and screeded by Jaeger Spreader-Finisher. Thus the finishing machine has an ideally prepared surface to work on. The Jaeger Finisher-Float, towed behind, carries its own oscillating screed and 30" wide float pan suspended between long side trucks on bogey axles, providing a 4-to-1 ratio of correction *independent* of any *irregularities in the adjacent side forms*. This final "kiss" finish leaves a machine-perfect surface ready for straight edges, burlap drag and spray coat.

How a small crew can give you high production on this year's work

Under today's close bidding, the cost savings made with this efficient paving train can well make the difference between break-even and profit.

In the Jaeger Spreader-Finisher you have a one-man machine that spreads and makes first finishing pass in the same operation.

When followed by the Jaeger combination of finishing machine and finisher-float, you have a sequence of 3 additional screeds and a float pan, producing a surface that meets the most rigid specifications with only one operator on the finishing machine and 2 or 3 men for final edging.

HYDRAULIC-SMOOTH OPERATION

Jaeger hydraulic power, giving easy finger control of all spreading and finishing functions, means fast, smooth, more accurate operation. Eliminates common mechanical problems.

Hydraulic self-widening up to 6′ is also available in both spreaders and finishers—a tremendous time-saver on variable widths and flared slab. On interchange work this infinite width adjustability, plus Jaeger's hydraulically controlled diagonal screed which spreads up-hill on super-elevated ramps, can save hundreds of dollars a day by maintaining full capacity operation of the contractor's plant.

Before you bid, before you plan this year's work, ask your Jaeger distributor to give you detailed performance data—or write for our complete paving catalog.

THE JAEGER MACHINE CO., 223 Dublin Ave., Columbus 16, Ohio. Jaeger Machine Co. of Canada, Ltd., St. Thomas, Ontario. Worldwide sales and service through Jaeger International Corp., Apartado 137, Panama, R.P.

JAEGER

HYDRAULIC-SMOOTH PAVING EQUIPMENT

. . . for more details circle 316 on enclosed return postal card

Court Decisions

Suppliers of Material on Government Contracts

Production and laying of asphalt paving for the Key Field Project at Meridian, Mississippi, under contract with the United States had been subcontracted to the Acme Asphalt Paving Company by T. F. Scholes, Inc., with whom a subcontract had been made by the prime contractor for grading and asphalt paving.

The Acme Asphalt Paving Company had then contracted with the Mississippi Testing Laboratories for the necessary supervision and testing work necessary in putting the asphaltic material together in correct proportions to meet the specifications and requirements for the asphalt mix to be used on this paving project.

Work by the Laboratories was completed in May, 1958, for which it demanded $1,966.61 for the performance of the contract. Failing to receive payment, the Laboratories brought suit against the U. S. Fidelity and Guaranty Company which, as surety, had executed the performance and payment bond required by law on federal projects.

By the Federal statute, known as the Miller Act, it is provided, "Before any contract exceeding $2,000 in amount, for the construction, alteration or repair of any public building or public work of the United States is awarded to any person, such person shall furnish to the United States the following bonds, which shall become binding upon the award of the contract to such person who is hereinafter designated as 'contractor': * * * a payment bond with a surety or sureties * * * for the protection of all persons supplying labor and material in the prosecution of the work provided for in said contract, for the use of such person."

That suit was dismissed a few months ago and the company denied a recovery against the surety. "The legal question to be answered is," said the Federal court in this decision, "did the facts, especially the contractual relations of the Mississippi Testing Laboratories with the subject matter of the contract between the United States and the prime contractor, Tyler-Hyde, meet the requirements of the Miller Act."

Shortly after this statute was passed by Congress the United States Supreme Court had occasion to apply it to circumstances substantially identical to those involved in this Key Field Project. In that instance the court said, "The right to bring suit on a payment bond is limited to (1) those material-men, laborers and subcontractors who deal directly with the prime contractor and (2) those material-men, laborers and subcontractors who, lacking express or implied contractual relationship with the prime contractor, have direct contractual relationship with a subcontractor and who give the statutory notice of their claims to the prime contractor.

"To all those in more remote relationships to recover on the bond would be contrary to the clear language of the proviso and to the express will of the framers of the Act."

In commenting on this conclusion of the United States Supreme Court the Federal court in this recent denial of a recovery by the Mississippi Testing Laboratories said, "If we accept the Supreme Court's statement that the right to bring suit on a payment bond is limited to (1) 'those * * * who deal directly with the prime contractor and (2) those of the same class 'who, lacking express or contractual relationships with a subcontractor and who give the statutory notice of their claims to the prime contractor,' it is hard to see how the Laboratories can sue upon the bond."

Reference: Elmer, doing business as Mississippi Testing Laboratories, v. U. S. Fidelity & Guaranty Co., 174 F.S. 437, Mississippi, June 12, 1959.

Hot Oil Injury

When three experts agree on something, it would seem to leave little room for further argument. That did not prove to be the case, however, in an action brought by a construction worker on a Minnesota highway against an oil company. The U.S. District Court ruled that although the three expert witnesses produced by the plaintiff all were of the opinion that the accident was caused by some foreign substance in the oil, not one of them could say what the foreign substance was, thus making their testimony of little value.

The accident happened when oil was being heated in a melter. On the previous day when the oil was being heated a leak had developed and the oil had been removed and stored overnight in barrels. When it was heated a second time and had reached a temperature of about 440 deg. F, the oil spurted out through vents in the top of the melter and burned one of the crew who was standing about 30 ft. away with his back to the machine.

In the trial of the action the injured man put three expert witnesses on the stand—the foreman who had helped in the design of the melter and who had worked with it for six years, a mechanical engineer, and a chemical engineer. A verdict for the plaintiff, predicated largely on the testimony of these three experts, was appealed. In overturning the verdict, the Court pointed out that although the three experts were unanimous in blaming the accident on a foreign substance in the oil, the foreman had no knowledge of the chemical construction of oil, the mechanical engineer also knew little about oil, and the chemical engineer had made no analysis of the oil and had not examined the machine. (Altrichter v. Shell Oil Co., 170 F. Supp. 851.)

CONTROLLED BLASTING

Continued from page 56

The muck was used for rock fill near the tunnels.

Fresh air for the tunnel crews was provided by a Joy 25,000 cfm reversible electric fan hooked to a 30-in. supply line. The Koehring Dumptor was equipped with a Ruth diesel exhaust gas conditioner, model MRX-406M.

Difficult Portal Work

The first step in portal preparation was the blasting necessary to provide a vertical face into solid rock. The drilling was by jackhammers until the jumbo could assist. The drill pattern followed standard procedure —down holes, lifters, and spot drilling to pick up loose ends.

The cleanup of the face to insure that all loose rock was dislodged required extensive high scaling. The contractor and engineers conferred frequently to evaluate all questionable areas. In one instance rifle shots were made to see if a hard-to-get-at rock could be dislodged.

Once the portal face was judged to be acceptable, the work of anchoring a protective shelf above the tunnel entrance started. In starting, the jumbo was used to shoot the first round to start the bore. Then, after mucking, the jumbo was again moved into position and one steel rib set to line and grade. The top-level crew then drilled ten 3½-in. holes at an upward angle to a depth of 12 ft. on about 2-ft. centers just above the steel. Mine car rails 15 ft. long, with both flanges torched off, were then driven securely into these holes. Another set of holes was drilled about 3 ft. above the rails to anchor rafter like braces to connect the ends of the rails to the rock wall above. The ends of the rails were also welded to the top of the first steel rib.

The net result was: (1) the steel was firmly anchored, and (2) a shed type roof protected the tunnel entrance against falling rockks. The main portion of the portal was ultimately covered with concrete retaining walls.

A somewhate unique feature of the east portal was the draping of chain link fence over much of the portal and adjoining areas to prevent future rock slides. Rock bolts were used to anchor the fence.

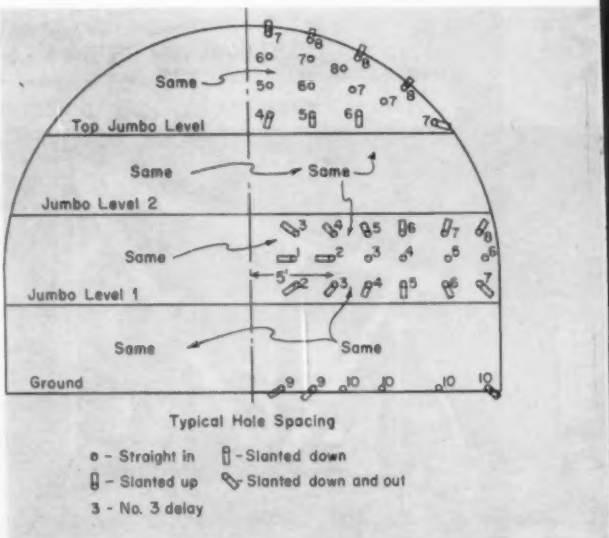
Placing Steel Ribs

Each 3,000-lb. fabricated steel rib consisted of four pieces of 10″ x 8″ 39 lb. WF. Two lengths provided columns to the spring line. The other two each formed one-half of the arch section. Ribs were spaced about 4 ft. apart.

The ribs were placed and anchored by the jumbo crew. The top level of the jumbo was equipped with stiffleg and Chicago Pneumatic winch for shifting and final positioning of the ribs prior to anchoring. Ribs were spaced by wood members as collar braces. Then 3″ x 6″ skeleton timber lagging was used as required along the sides and to shore up the hanging wall.

The first step in setting a rib was to align the columns and then use 4″ x 8″ x 12″ wood blocking to bring them to grade. The arch sections were then

Eimco 105 loader which was the mucker and general rock handler in and around the tunnel.

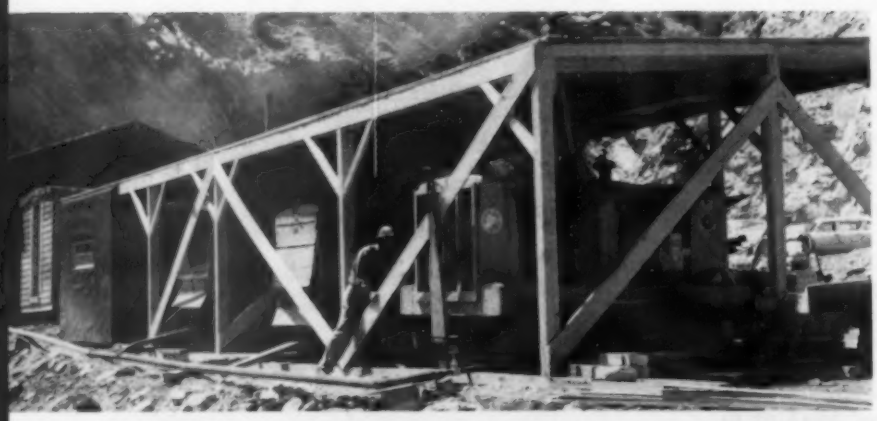


Typical drilling diagram for tunnel headings.

North tunnel and pioneer bore seen from west end illustrates nature of rock encountered, steel ribs, and lagging.

Drawers in explosive truck were divided and numbered for safe transport and easy selection of proper delay primer.

West portal as it looked with steel ribs and bracing in place.



Air for drilling was supplied by two 600 and one 900 cfm compressors connected to a common manifold.

bolted to the columns.

The entire length of both tunnels was concrete-lined. In all areas the lining was a minimum of 1.5 ft. in thickness as no solid rock section ground was encountered.

The tunnel pavement consisted of a 6 in. granular leveling course and an 8 in. concrete slab.

Service Equipment

The progress of the project and equipment maintenance depended upon a number of pieces of equipment which have not been mentioned:

Lagging and shoring required considerable sawing of rough lumber; a De Walt model GF saw handled this job.

Large gallonages of water were used in drilling. A 4-in. CMC centrifugal pump on the banks of Clear Creek served this purpose.

While commercial power was available at the site, a Kohler model 5M21 electric plant was on hand for emergencies and odd jobs.

A truck-mounted Lincoln SAE 400 shielded arc welder was almost continually in use, either for maintenance or anchoring steel ribs.

Also in almost constant use was a truck-mounted A-frame powered by a Highway RFL winch.

As long as the work was in the portal stage determined super-

Continued on page 130

Bethlehem announces . . .

11

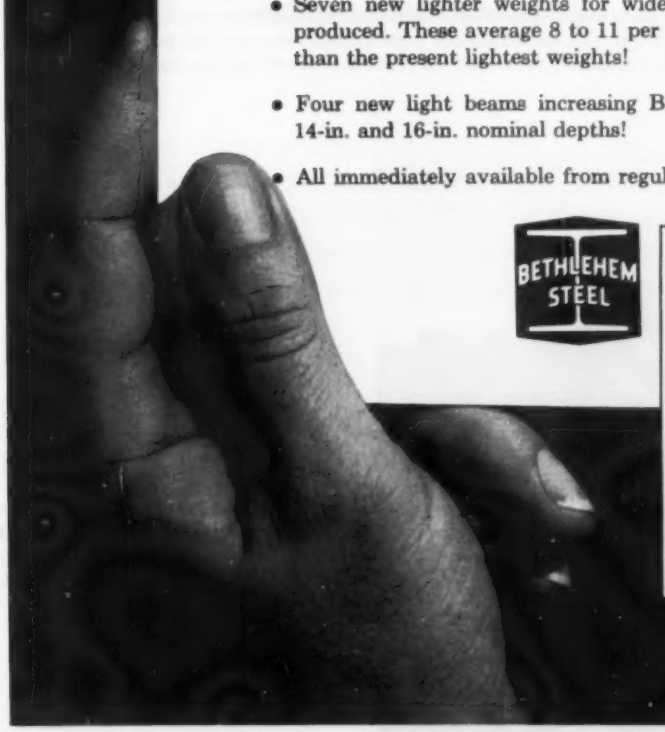
NEW LIGHTWEIGHT WIDE-FLANGE BEAMS!

. . . for still greater economy in steel construction

Steel
for Strength Economy Versatility

These new sections, combined with the new ASTM Specifications for higher-strength steels (A36, A440, A441), will provide still greater flexibility and economy in steel construction.

- Seven new lighter weights for wide-flange beams currently produced. These average 8 to 11 per cent less weight per foot than the present lightest weights!
- Four new light beams increasing Bethlehem's BL series to 14-in. and 16-in. nominal depths!
- All immediately available from regular rolling schedules!



free booklet gives all details

BETHLEHEM STEEL

PUBLICATIONS DEPARTMENT
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

Please rush me a copy of Booklet 582, "11 NEW LIGHTWEIGHT WIDE-FLANGE BEAMS."

Name .....
Company .....
Address .....
City ..... *Zone* .... *State* .....

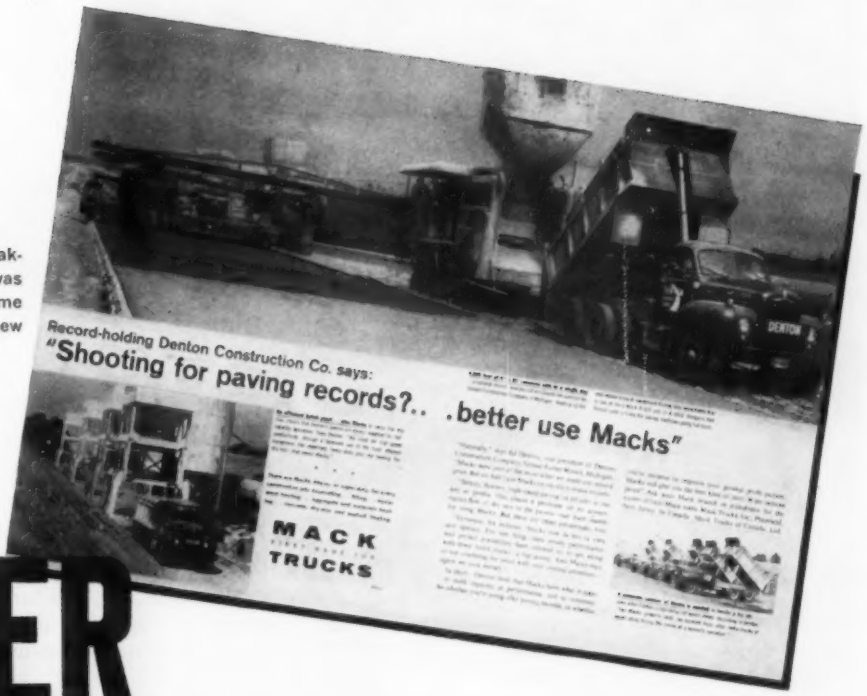
Export Sales: Bethlehem Steel Export Corp., 25 Broadway, New York 4

. . . for more details circle 282 on enclosed return postal card

A Mack B-42 has just finished loading a paver and is ready to return to the batch plant for the next load. The outstanding tractive characteristics of the famous Mack Balanced Bogie tandem rear axles with exclusive PowerDivider and special balloon tires successfully eliminated the problem of sandy hauling conditions.

Mack batch trucks line up in plant yard. Same Mack B Models that established record for Denton in 1958 and again in 1960 have been in constant operation for as long as four years.

Denton Construction Company's record-breaking performance in the summer of 1958 was described in this advertisement. The same Mack trucks were on the team when the new paving record was set.



WINNER AND STILL CHAMP!

The record for a single day's concrete paving footage has been broken again by Denton Construction Company, Grosse Pointe Woods, Michigan. Topping their 1958 record by a substantial margin, Denton placed 8,036 feet of 9″ by 24′ reinforced concrete slab in a 12-hour working day.

Handling 3,898 batches required to cover the mile and a half strip were *the same Mack trucks that made up the previous record-breaking team.* Many of these B Model dumpers had seen four years of constant use, but their unfailing performance and perfect availability kept four pavers going full blast throughout the entire operation.

Says Ed Denton, vice president of Denton Construction Company, "Steady, flawless, high-speed paving on all jobs is our key to profits. This places a premium on good trucks—our main reason for using Macks."

Wherever your jobs call for standout performance, fuel economy, low maintenance or over-all earning capacity, you'll find Mack trucks the logical choice. For the trucks you need to get jobs done on schedule, and at a profit, see your Mack branch or distributor. Before you buy another truck, get the facts on Macks. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario.

0056

MACK FIRST NAME FOR **TRUCKS**

. . . for more details circle 327 on enclosed return postal card

CMC 4-in. centrifugal pump provided water for drilling.

CONTROLLED BLASTING

Continued from page 126

intendent Merrick worked his crews on an 8-hour, 6-day week. When most of the work got underground he went to two 10-hour shifts, on a 5-day week basis.

Lewis Chinn was general superintendent, Ed Williams Bridge foreman, Art Kokish grade foreman and Letton Smith timekeeper for Colorado Constructors, Inc.

Merrick has been a tunnel man for 30 years, working chiefly in western U.S. Over the years he has assembled a crew that follows him from job to job. More than one-half of this crew were former walkers or shifters. Probably the most widely known man on the crew was Clarence "Whitey" Enfield, who served here as walking boss. William Raeder was the shifter.

The Colorado department of highways has been represented on the tunnel project by Reuben Hopper, resident engineer, F. A. Mattie project engineer, and R. G. Eckles as instrument man.

Film Record Aids Condition Surveys

A new, low-cost system of photo-recording highway surfaces has been developed by the photogrammetric firm, Aero Service Corporation. It includes a precise strip camera, a specially equipped truck, a film projector and a reader-printer.

Sur/Fax film records, as they are called, aid research and pavement condition inventorying, furnishing a detailed record at a fraction of the cost and time compared with other methods. The 35 mm film is projected on a screen for study, or printed as strip maps.

The new system has been used at the AASHO test site in Ottawa, Illinois, and a program for coverage of major test areas in New York State is in progress. Surveys for several other states are planned using the method.

For detailed analysis, a specially modified 3-M Reader - Printer is used, as developed by Minnesota Mining and Manufacturing Corporation.

The Sur/Fax road unit with 35 mm strip camera and shielded lights making survey at night (usually 1:00 am to 5:30 am) to avoid traffic and to permit exact control of lighting conditions.

Other new devices in various stages of development in Aero Service's research facilities are automatic devices for gathering data for sufficiency rating systems, for highway inventories and for parking studies. These systems combine photographic sensors, micro - wave distance measuring devices, and electro - mechanical data reduction equipment.

Gamma ray equipment used to measure sub-surface densities

Scientific readings by the millions... recorded in the National Road Test

Sponsored by the American Association of State Highway Officials (AASHO), this 27-million-dollar test will provide "statistically unassailable" facts on modern pavement design.

On November 30th traffic ended on the 5 concrete and asphalt test loops near Ottawa, Illinois. 17 million miles of travel were marked up by the fleet of loaded trucks.

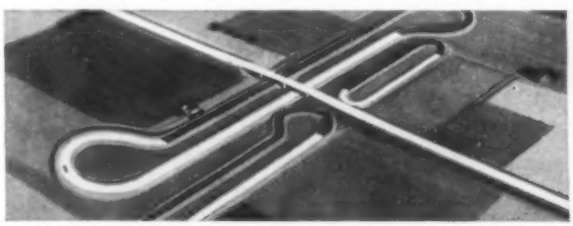
The entire National Road Test project is the most scientific experiment ever carried out on highway pavements. Modern statistical techniques, the newest in instrumentation, recording and automatic data processing equipment assure the total reliability and impartiality of findings.

Vital data have been pouring in, useful new facts on pavement performance are evident. The final result—a storehouse of engineering information needed by every engineer, official and legislator to plan and build the most practical, efficient road system possible.

For Interstate highways—and all roads and streets—the National Road Test will prove the most significant test of pavement types of all time.

PORTLAND CEMENT ASSOCIATION

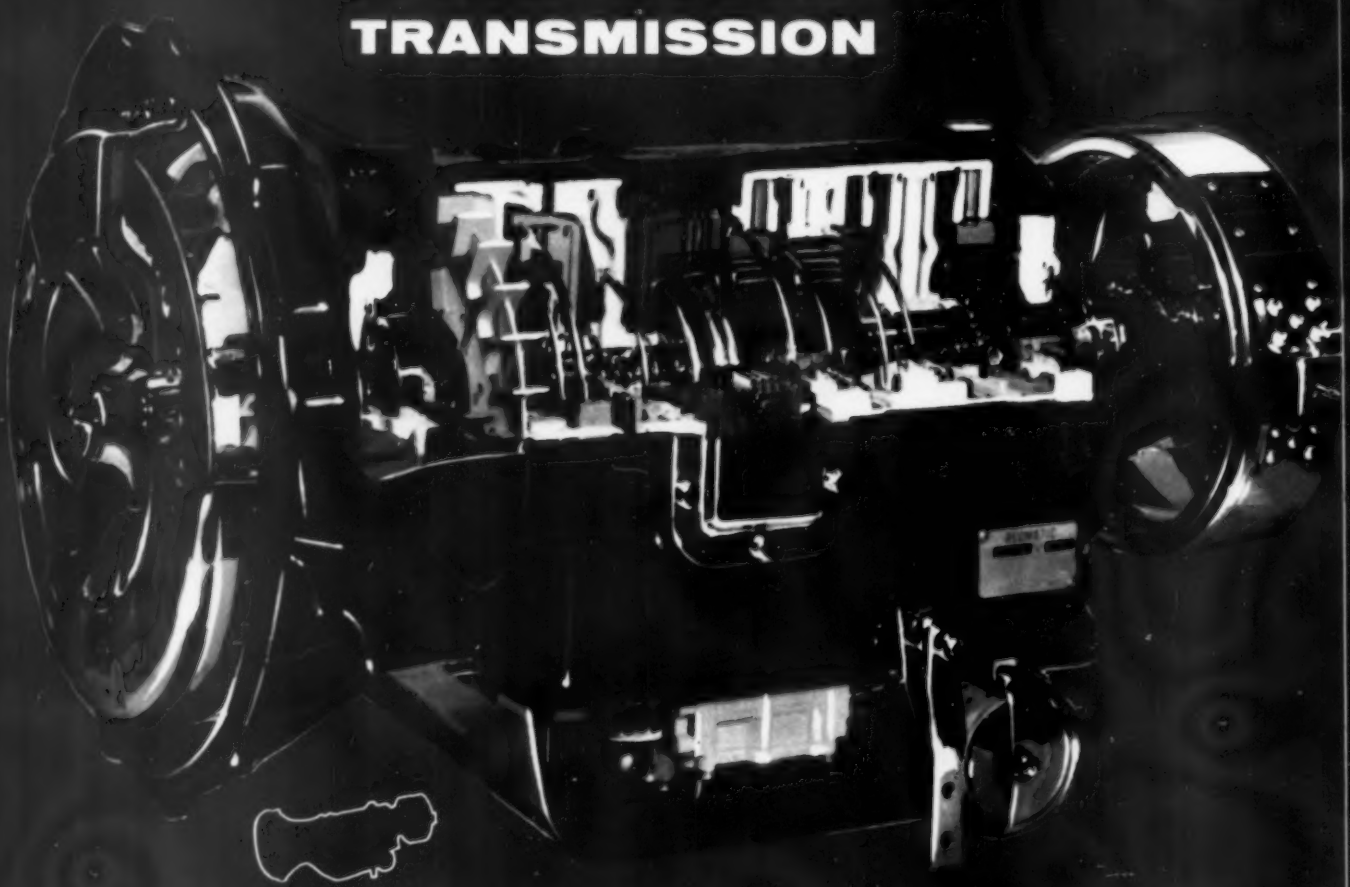
A national organization to improve and extend the uses of concrete



836 test sections—repeating nearly 200 different pavement combinations make up the loops. Over 1,100,000 load applications have been recorded.

REO

FULLY PROVED, FULLY AUTOMATIC TRANSMISSION



REO and REOMATIC A PROVEN CONCEPT . . . ReoMatic transmission eliminates the conventional clutch pedal and the guesswork of inexperienced drivers. Automatically, it selects the most efficient gear ratio in each drive range and shifts gears under full throttle in response to load demands upon the engine. There's no power interruption, no engine lugging, far less chance of shock load damage to drive lines. Result: operators of both over- and off-highway fleets report faster operating schedules, reduced maintenance and downtime costs, prolonged engine life. Make no mistake. ***The ReoMatic is not a beefed up automobile transmission.*** It's a rugged, heavy duty unit specifically engineered to team up with famous Gold Comet engines (130 to 235 h.p.) in the ***World's Toughest Trucks.*** So before you buy anything, get the full story on the Reo that's right for your job — equipped with ReoMatic fully automatic transmission.

MATIC

Gold Standard of Values

REO MOTOR TRUCK DIVISION, THE WHITE MOTOR CO. • LANSING 20, MICH.

WESTERN UNION TELEGRAM

WU7 PD TORRINGTON CONN NOV 23 1259P EST

BUFFALO-SPRINGFIELD CO

SPRINGFIELD OHIO

PICKED YOUR 3 AXLE VIBRATORY ROLLER FOR VERMONT INTERSTATE 89 CONTRACT AFTER SEEING IT IN ACTION ON ANOTHER JOB. WAS FASTEST METHOD I HAD EVER SEEN FOR COMPACTING BASE COURSE. AFTER USING IT NOW KNOW IT'S FINEST VIBRATORY ROLLER ON MARKET

CHARLES L ROSSI, S V ROSSI CONSTRUCTION CO INC

TORRINGTON CONN

119P.

"Finest Vibratory Roller on the Market"

says Charlie Rossi, S. V. Rossi Construction Co., Inc., Torrington, Conn.

Buffalo-Springfield KX-25EV 3-axle Vibratory Roller features exclusive "walking beam" compaction control. Center roll vibration from 1500 to 2200 vpm. Center roll can be raised hydraulically and machine used as two-axle tandem. Or you can use it as standard 3-axle tandem without vibration. See your Buffalo-Springfield distributor.

BUFFALO-SPRINGFIELD COMPANY

Springfield, Ohio

A Division of KOEHRING *Company*

B102

. . . for more details circle 318 on enclosed return postal card

Continuous tiling along each shoulder was prescribed for the Ohio freeway job. Contractor put in 10,000 feet daily with two Gar-Wood Buckeye ditchers.

Freeway Job Gets 260,000 Feet of Tiling

Contractor Keith Hilaman of Norwalk, Ohio, recently made rapid footage on a drain tile job which typifies Ohio practice in Interstate freeway design. He has had the drain subcontract for a segment of Interstate 71. Tile lines were specified both inside and outside of each dual pavement. This method of soil drainage was first developed for proper drainage of farmland in the adjacent rich agricultural regions.

The standard pipe underdrains (Ohio State Highway Specification "I-4") are being laid in the shoulders offset 5 ft. from each side of the pavement. The depth of the ditch varies from 18 to 51 in. depending on the soil condition. The tile is backfilled with a layer of No. 6 gravel, then the remainer of the ditch is filled with sand. The drainage lines are connected by laterals leading to catch basins or farm outlets.

For putting in these drains, Hilaman used two Gar-Wood Buckeye Model 307 ditchers, with special buckets for forming a "contoured bottom" to cradle the tile. Often working side by side, the ditchers began cutting the trenches as soon as the final grading was completed. Hilaman is placing 260,000 ft. of tile on his subcontracted section, averaging 10,000 lin. ft. per day with two machines. The Buckeye machines have encountered almost every possible soil condition, from sand and clay to shale and solid rock.

Dave Davies, project engineer for the Ohio department of highways, stated that the installation of an effective drainage system is probably the most important phase of highway construction for this location. All drainage lines are checked to see that they are functioning properly before the overlying shoulder is "black-topped."

This project serves to spotlight the importance of drain-tiling roadbeds where conditions suggest that drainage may otherwise be less than adequate. In most parts of the country, moisture seeps into the roadbed beneath the pavement through capillary action. This moisture tends to weaken the subgrade, leading to pavement deterioration. The water will expand in freezing and may crack the pavement from below. All in all, excess moisture causes millions of dollars worth of damage to American roads each year where proper system of drainage is absent.

Bituminous Roads And Streets

Bituminous features appear between pages 136 through 149

Views & Comments

By H. G. Nevitt

Layer Functions Vary

Last month we initiated a discussion of the multilayered road structures now becoming popular, and made the point that this additional complexity was only justified by appreciable benefits from its use. The reasons for these numerous layers may be either technical or economic or both. We will cover one phase of the former in this installment.

Road structures carry loads through the fundamental resistance properties of materials—compression, tension and shear. Each of these properties, and the need for them in the various layers, must be considered separately.

If aggregates meeting the usual highway specifications are used, there will be no failures by direct compression, and this factor therefore does not require attention. Tensile stresses, requiring a binder exhibiting cohesion, were widely ignored in bituminous pavement design until a decade or so ago. The possibilities of benefit from this property were pointed out as early as the 1920s; but highway authorities were slow to appreciate them until field observations, culminating in the Washo test, clearly brought out the facts. Probably the most important advances in highway roadbed technology in recent years concern the attainment and utilization of tensile resistance in the road structure, through the use of suitable binders in an effective design.

Both these points (attaining and utilizing tensile value) are important. The binder properties limit the tensile strength obtainable. The design must be such that this binder functions to the maximum possible degree. Many designs today strive for these benefits from tensile resistance but actually fail to provide them.

Binders show tensile strength only in thin films, with the maximum strength occurring at an optimum film thickness. This strength, which varies in magnitude between asphalts, increases as the viscosity of the asphalt increases, while the optimum film thickness likewise increases with viscosity. With the asphalts normally available, to obtain any appreciable tensile strength the asphalt must be in the penetration range. If cutbacks are used the resistance from this effect will not be appreciable until after curing; previous to that time the structure must function due to other resistances. This functioning can and does frequently occur, but the mechanism should be clearly understood.

Any tensile strength possible from the binder in films of near optimum thickness can only be effective at the points of aggregate contact in the mix. If the total area of such contacts in the cross section is low, the tensile resistance will be low. Obviously the maximum would occur in a mixture exhibiting proper film thickness, but zero voids. For other reasons such a mixture is unsuitable, but it should be approached as nearly as is practicable if optimum tensile resistance is to be exhibited by the layer. Clearly a dense graded aggregate would be most desirable.

What layers provide the most benefit from the presence of tensile strength? The present state of knowledge concerning the internal stresses in a road structure does not permit an exact answer to this question. But we can approximate the situation, at least qualitatively.

Observation shows that flexible pavements take on reverse flexure under load. Immediately under the area of load application the pavement is depressed. Adjacent to this area the pavement is elevated, due to its resistance to flow by the granular or plastic material in the base or subgrade.

The former effect (depression) could impose tension on the lower layers of the structures, provided the compressive effects of the load directly above were not sufficient to neutralize it. In the usual design today this latter situation may, in fact probably does exist. Hence, effort to provide extra tensile strength in the lower layers is probably not justified, the thickness called for by the resistance of the aggregate as produced is the most economical. However it is easy to see that if loads or traffic intensities continue to increase, it may become desirable to design a pavement exhibiting tensile resistance in both top and bottom. This would be particulary desirable over low support subgrades. The benefits of adding this resistance increase as the pavement thickness otherwise required increases.

The reverse flexure resulting from the strain of resisting lateral and vertical stresses—that is, the stress due to the surcharge or confinement effect of pavement—obviously requires tensile resistance in the upper layers. Providing such tensile resistance will materially increase the load distribution properties of any design. Every pavement should provide such resistance in its final form, even though in some phases of stage construction this property is not present or appreciable.

Cohesion has another benefit in the region under the load. The pressure the load develops tends to result in lateral flow of the granular

or plastic base. Tensile resistance can help oppose this effect as does shear, particularly with predominantly granular layers. Obviously the required resistance decreases with depth. Clearly tensile strength is a desirable asset in a pavement design.

The shearing stress pattern is somewhat clearer, but still not as definite as would perhaps be desirable. The load distribution may be primarily through shear resistance in granular layers above and plastic ones below (as is commonly the case), then, cohesive resistance only is depended upon to aid in giving confinement to these lower layers, and there will be a gradual decrease in shear resistance with depth in the structure. Below a certain depth this decrease will occur regardless of the shearing resistance ability of the layers. The rate of shear decrease is in turn dependent on the ability of the layer to laterally distribute the load and the decrease will to some extent be dependent on the characteristics of the layer material.

The shear stress pattern is then, in the above type of structure, the maintenance of a relatively high intensity to a short depth, after which it shows a gradual decrease until the shear resistance value of the basement soil is at least reached. There is correspondingly no need to utilize high resistance material in these lower layers if appreciable economic benefit results from not doing so. At the same time highly frictional layers, even though not stressed to their limiting intensity, do distribute the load more rapidly, hence decrease the structure depth required, and would be advantageous to use at nearly the same cost. Unfortunately there is not sufficient data available to express these qualitative conclusions with exact numbers; the usual thickness approaches therefore do not allow for the quality of the layers below the cohesive pavement, although they do include some rules of guidance in the selection of these layers.

If tensile resistance is resorted to for support under the load as well as to provide confinement, as might be desirable for heavy loads over a very weak basement soil, the above pattern may be somewhat modified. To get this complete beam action the thickness of the top pavement layer must either be appreciable, or cohesion must be supplied in the lower layers likewise. In this latter use there will be appreciable vertical and horizontal shearing stresses down to and through these lower cohesive layers, as a result of the beam action. Correspondingly there must be appreciable shear resistance in all the layers down to and somewhat beyond this depth before tapering off occurs, or the flexural resistance desired will not be obtained. Obviously this design represents a considerable modification of our past construction.

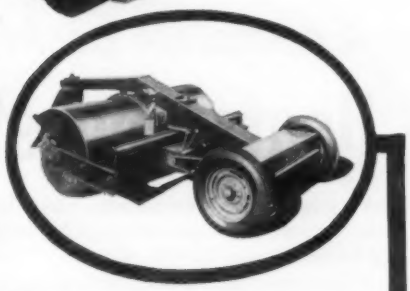
It is quite evident from the preceding analysis that strong functional reasons for a multilayered structure exist. Other technical considerations leading to this same general conclusion, and a summation of the matter from the technical point of view, will be discussed in a following review.

"NEW BROOM SWEEPS CLEAN"

on street or highway

STANDARD STEEL

ENGINE and TRACTION DRIVEN CONSTRUCTION BROOMS



Check these features:

- Two way, 15° and 30° brush positions.
- Up to 73" wide sweeping patch even at 30°.
- Easy acting screw type lifting device eliminates troublesome hydraulic systems.
- High position broom lock for traveling.
- Wear equalizer adjustments at each end of brush.
- Chain drive from counter shaft to brush shaft.
- Traction model has 2 speed transmission.
- Engine model has 15 HP VE-4 Wisconsin power.

Write us or see your dealer for complete details.

OTHER PRODUCTS OF STANDARD STEEL
ASPHALT DISTRIBUTORS . . . BURNERS . . . POWER AND TRACTION DRIVEN CONSTRUCTION BROOMS . . . MAINTENANCE DISTRIBUTORS . . . TAR KETTLES . . . AGGREGATE SPREADERS STREET FLUSHERS . . . PIPE LINE EQUIPMENT . . . SUPPLY TANKS SHELVING HARDWARE . . . AND AGRICULTURAL EQUIPMENT

Built to the Highest Standard

Standard Steel Works, Inc. NORTH KANSAS CITY, MO. BR-1-57

. . . for more details circle 338 on enclosed return postal card

The Asphalt Institute Shuffles Research Team

A re-alignment aimed at freeing The Asphalt Institute's engineer of research for broader responsibilities is announced by Dr. J. E. Buchanan, Institute president.

John M. Griffith, engineer of research, has been designated director of research and development and assigned to work in close liaison with research men in the state highway departments. Mr. Griffith's new role of roving emissary is expected to relate Institute laboratory investigations more closely to parallel work being done by the several states. This exchange of information is expected to offer many opportunities to field-test Institute developments through state facilities.

B. F. Kallas, former assistant engineer of research, becomes research engineer, directly responsible for laboratory activities at the Institute.

"The need for a closer working relationship between the Institute research team and their opposite numbers in the several states has long been recognized," said Dr. Buchanan. "In addition, the Institute is handicapped by lack of facilities for field application of its research projects. We feel that Mr. Griffith, working closely with the state agencies, will serve the best interests of all of us working toward improved design and construction of asphalt pavements."

Colorado Will Test Asbestos Paving Fibers

The Colorado state highway department plans an experiment program to determine whether the addition of asbestos fibers will improve the quality of asphalt paving using poor quality aggregate, such as is found in the eastern part of the state.

According to Emil G. Swanson, materials engineer, the addition of asbestos fibers would hike the cost by $2,200 a mile. If the experiment is successful it would increase the longevity of the highway.

Test strips will be located on US 24 near Colorado Springs and on US 36 west of Last Chance. Two firms have agreed to furnish the department with 33 tons of free asbestos, worth about $5,000 for the experiment. They are Johns-Manville and Clute Corp.

Colorado is one of the first states to try out asbestos, according to Swanson, who said manufacturers contend that asbestos fibers will increase stability at high temperatures and resistance to impact and abrasions at low temperatures and help prevent cracking.

New Small-Business Finance Company

Contractors seeking corporate financing may be interested in a new company, Business Capital Corporation, launched in Chicago recently with $5 million capitalization. One of the largest companies in the U.S. is a small-business investment field. The firm is backed by officers in some of Chicago's large and long established financial institutions.

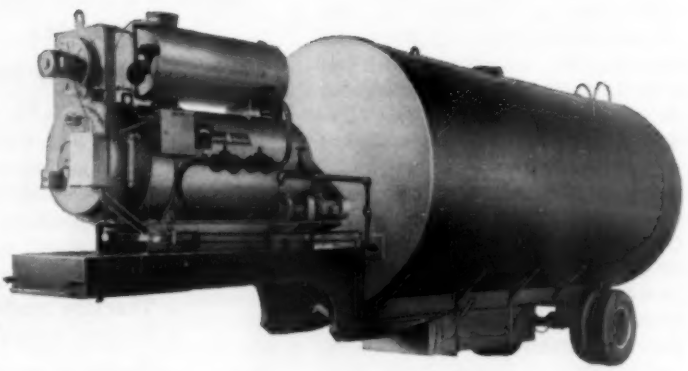
A complete package ready to roll...

Heats and stores asphalt on the job

You can speed bituminous and hot mix operations with the all-new Cleaver-Brooks asphalt storage-heater plant.

Easy to get to the job, the entire unit can be moved without dismantling or repiping. Just hitch it to your tractor and you're on your way.

Easy to use on the job, it provides low-pressure, high-temperature (up to 450 F) heat with a Peak-Temp *oil* heater that does away with freeze-ups, pressure fittings, water problems and other costly heating problems. Check into this fully automatic, completely dependable method of heating and handling asphalt on the job. Write Cleaver-Brooks, Dept. B, 395 E. Keefe Ave., Milwaukee 12, Wis.

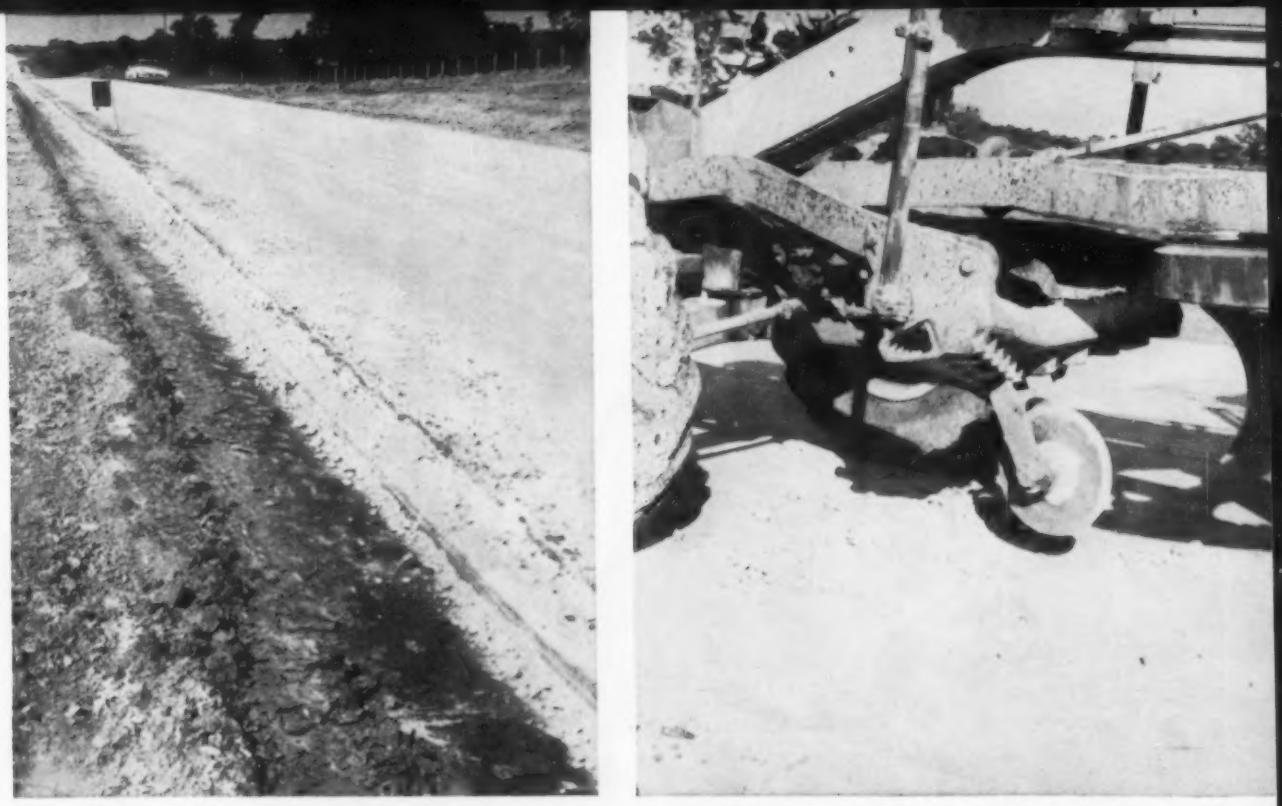


This packaged unit is available with capacities of 10,000, 15,000 and 20,000 gallons. 300-gallon fuel tank for heater. Total weight: 22,500 lbs. with 10,000-gallon tank and CPT-8 Peak-Temp oil heater.

Cleaver Brooks®

ORIGINATOR AND LARGEST PRODUCER OF PACKAGED BOILERS

... for more details circle 286 on enclosed return postal card



Cutter mounted for use, and example of clean edge achieved with its help.

Grader-Mounted Cutter Permits Neat Pavement Removal

How to make a smooth cut through an existing pavement was a problem facing R. W. McKinney, and T. L. James, joint venture contractors on a recent Texas road project. The job entailed reconstructing 6.83 miles of State Highway 90 between Navasota and Brenham. The flexible base of the road had to be cut to a total depth of at least 4 in. along the centerline, which was where the cutting problem came in.

This requirement was satisfied by using a Rogers Asphalt Cutter, mounted on the scarifier bar of a Caterpillar 14 motor grader. The diameter of the cutting wheel was 16 in., which permitted it to cut to a depth of 4½ in. It required about 10 minutes for two men to remove the scarifier teeth from the bar and install the cutter.

The original pavement was asphaltic concrete, 24 ft. wide, placed at 100 lb. per sq. yd. on a flexible base of crushed stone. The contract required the contractors to remove the pavement and flexible base by the half-section method, store the material along the shoulder, then stabilize the subgrade with lime.

Following this, the base material was salvaged to produce a new roadbed with the following finished section: 7 in. thickness of compacted, lime stabilized subgrade, by half-section; 4½ in. of compacted, salvaged and replaced flexible base, lime stabilized, by half-section; 4½ in. salvaged and replaced flexible base, lime stabilized, built to full section in one operation; and 26 ft. width of two-course asphaltic concrete resurface.

As a detail in keeping the undisturbed half-section open to traffic, it was desirable to make a smooth cut through the pavement and base along the centerline. This was done to prevent major pavement breaks from extending into the undisturbed half-section and causing a hazard.

The cutter did an excellent job, as shown in accompanying photograph taken after the cutting was completed. Even with the full weight of the front end of the motor grader on the cutter, it usually required four passes to obtain the required depth. The centerline was marked with binder twine to guide the cutting which was extended about one mile at a time.

After a section of the pavement was cut, the area was scarified with teeth mounted on a bulldozer blade. Then the pavement and base were pulverized with a Pulvimixer, and the material was graded into a windrow alongside, to be salvaged after the subgrade had been stabilized.

Several combinations of asphaltic treated subbase, black base and surface layers are being used for various segments on I-35 in Oklahoma. The variations in cross-section were adopted for experimentation, with the cooperation of the Bureau of Public Roads.

Multi - Layer Asphalt Paving for Oklahoma I-35

A bituminous pavement system 15 to 21 inches thick is the engineers' answer for a section of Interstate 35, nearing completion southwest of Perry, Oklahoma. This many-layered roadbed, designed for the heavy traffic along the Oklahoma City to Wichita axis, was built with high-speed equipment and under latest precision controls.

These notes review the 6.2-mile dual freeway section for which Broce Construction Company, Woodward, Oklahoma, is currently finishing up at $1,403,000 base and paving contract. Broce's work was to construct a select soil subbase of variable thickness, an asphalt treated stabilized aggregate base 6 to 12 in. thick and 32½ to 34½ ft. wide, a 5-in. hot plant mixed black base 30′ 8″ wide, and

Showing a section of I-35 well along toward completion. Foreground: two 2½-in. black base courses placed. Next strip to left: 2½-in. binder leveling has been placed. An additional lift of 2¾ in. of black base and a single surface treatment will be placed on the shoulder section, and 1½-in. surface course put on the travel way.

two layers of asphaltic concrete 24 ft. wide for each roadway. Also 10 ft. outer and 4 ft. inner shoulders, asphalt paved.

The select subbase and the treated base, while varying in respective thickness along different stations, were laid to a constant combined depth of 15½ in. Total depth from template grade to top of pavement was 24½ in. The scheme of varying the select subbase and the treated base was adopted as a means of meeting changing strength requirements. This decision in turn was based on the data obtained from in-place subgrade soil samples.

Select Subgrade. Called "suitable soil" in Oklahoma, this was a substance which

Continued on page 145

Several combinations of asphaltic treated subbase, black base and surface layers are being used for various segments on I-35 in Oklahoma. The variations in cross-section were adopted for experimentation, with the cooperation of the Bureau of Public Roads.

Multi - Layer Asphalt Paving for Oklahoma I-35

A bituminous pavement system 15 to 21 inches thick is the engineers' answer for a section of Interstate 35, nearing completion southwest of Perry, Oklahoma. This many-layered roadbed, designed for the heavy traffic along the Oklahoma City to Wichita axis, was built with high-speed equipment and under latest precision controls.

These notes review the 6.2-mile dual freeway section for which Broce Construction Company, Woodward, Oklahoma, is currently finishing up at $1,403,000 base and paving contract. Broce's work was to construct a select soil subbase of variable thickness, an asphalt treated stabilized aggregate base 6 to 12 in. thick and 32½ to 34½ ft. wide, a 5-in. hot plant mixed black base 30′ 8″ wide, and

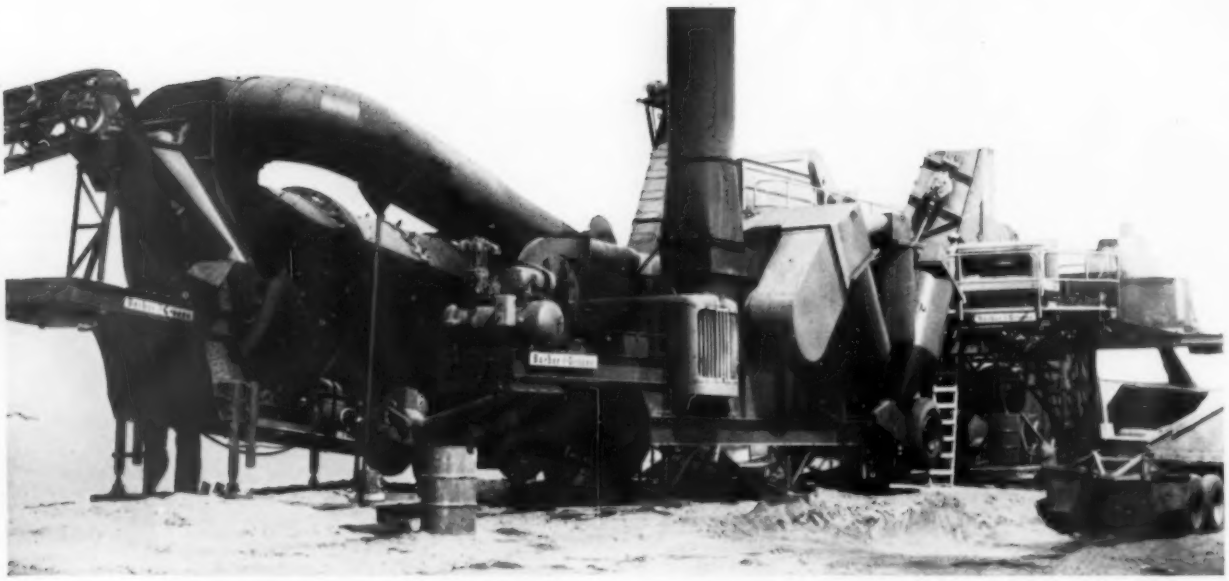
Showing a section of I-35 well along toward completion. Foreground: two 2½-in. black base courses placed. Next strip to left: 2½-in. binder leveling has been placed. An additional lift of 2¾ in. of black base and a single surface treatment will be placed on the shoulder section, and 1½-in. surface course put on the travel way.

two layers of asphaltic concrete 24 ft. wide for each roadway. Also 10 ft. outer and 4 ft. inner shoulders, asphalt paved.

The select subbase and the treated base, while varying in respective thickness along different stations, were laid to a constant combined depth of 15½ in. Total depth from template grade to top of pavement was 24½ in. The scheme of varying the select subbase and the treated base was adopted as a means of meeting changing strength requirements. This decision in turn was based on the data obtained from in-place subgrade soil samples.

Select Subgrade. Called "suitable soil" in Oklahoma, this was a substance which

Continued on page 145



ONE OF 54 NEW DRYERPACS is shown on Barber-Greene Continuous Mix Plant. By offering the industry's broadest choice of dryer-dust collector combinations, only Barber-Greene gives you balanced components custom fitted to your plant capacity and your own operating conditions. Benefits: lower initial and operating costs, longer life, higher resale.

54 NEW BARBER-GREENE ANY PLANT CAPACITY

New line developed after comprehensive two-year tests breaks dryer bottleneck in hot mix production, assures top capacity per dollar of plant investment.

Barber-Greene's 54 new Dryerpacs take the guess and gamble from selecting the correct dryer-dust collector combination needed to produce lowest cost hot mix at any rate from 65 to 350 t.p.h.

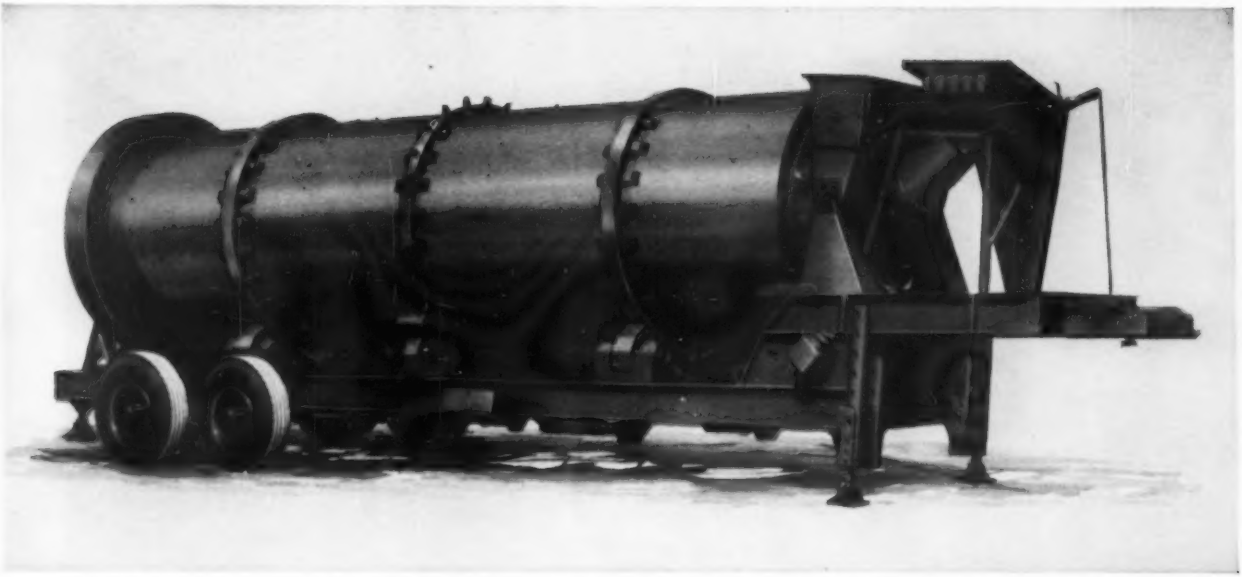
Now you can choose from 27 drying capacity ranges in either stationary or portable models. Drum sizes range from 5′ x 20′ to 9′ x 30′, and air flow capacities of 12,000 to 54,000 c.f.m. For small plants in the 30-65 t.p.h. range, you can select from two single chassis Dryerpacs.

Outgrowth of comprehensive test program

All 54 new dryer models offer optimum performance through scientifically balanced designs. By conducting the industry's most comprehensive dryer testing program, Barber-Greene was able to put the many interrelated factors influencing dryer performance in their proper perspective. And from this two year research program comes equipment that breaks the dryer bottleneck in asphalt plant production for more profitable operation.

Outstanding new dryer features include: exclusive cradle chain drive for up to four times longer chain life; self-adjusting seals that reduce fines loss and improve combustion; exclusive power driven clog-free rotary inlet chute; special Man-Ten steel plate used for drum shell handles heat stresses without warping; roto-elevator discharge eliminates pit, assures positive flow; and a complete selection of burners which can be equipped with automatic controls.

Call your Barber-Greene Distributor for assistance in selecting the Dryerpac custom fitted to your needs. You'll get further proof why the modern Barber-Greene BatchOmatic and Continuous asphalt plant lines lead the industry for lower cost high capacity production, most accurate and automatic operation, lower maintenance, and the ultimate in portability when required.



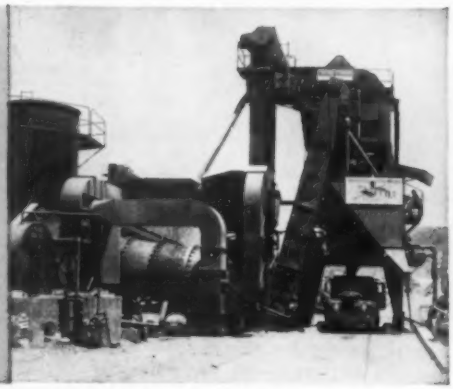
Barber-Greene Dryer Line offers industry's most advanced dryer design. All dryers in the DA series (20' drum) and DC series (30' drum) are offered in a selection of air flow capacities. Each dryer operates with capacity-balanced portable or stationary dust collectors as one system and assures you top plant capacity per dollar of plant investment.

DRYERPACS* CUSTOM FIT FROM 65 TO 350 T.P.H.

**Dryer-Dust Collector Combinations*

SEND FOR NEW BULLETINS. 16-page Dryer Principles describes and gives conclusions drawn from most comprehensive dryer testing program ever conducted. Dryerpac Bulletin shows many outstanding features of this 54-model line and presents for the first time the multitude of related factors required for optimum dryer performance. You'll find both brochures helpful in pointing the way to most profitable plant operation.

New Dryerpac line includes a complete selection of stationary drying equipment for either highway or urban batch plant operation. Matched Stationary Collectors offer flexibility in plant arrangement and disposition of collected fines. Two Wet Collector Series are available in a wide range of efficiencies to meet any air pollution code at the most economical level.



World's No. 1 Manufacturer of Asphalt Paving Equipment

Representatives in Principal Cities of the World

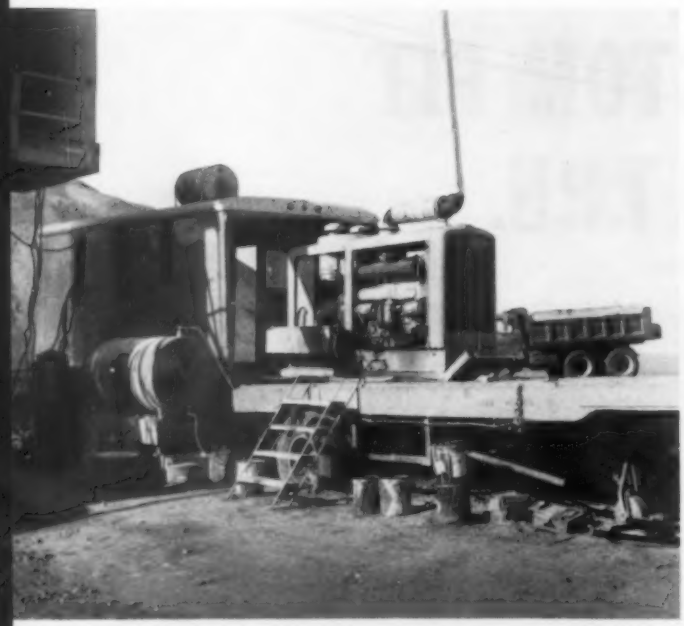
Barber-Greene BG

Main Office and Plant AURORA, ILLINOIS, U. S. A.
Other Plants: DeKalb, Milwaukee, Detroit, Canada, England, Brazil, Australia

CONVEYORS • LOADERS • DITCHERS • ASPHALT PAVING EQUIPMENT

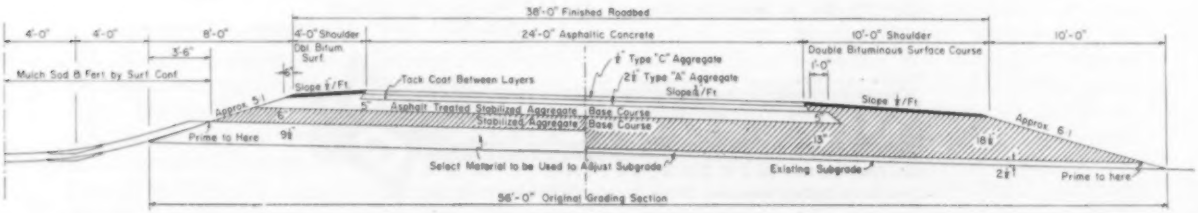
. . . for more details circle 346 on enclosed return postal card

Large stockpiles of stone and sand were manipulated with care to eliminate any segregation tendencies. Machines shoved material upward and through a slot to a centrally located crane (see layout).

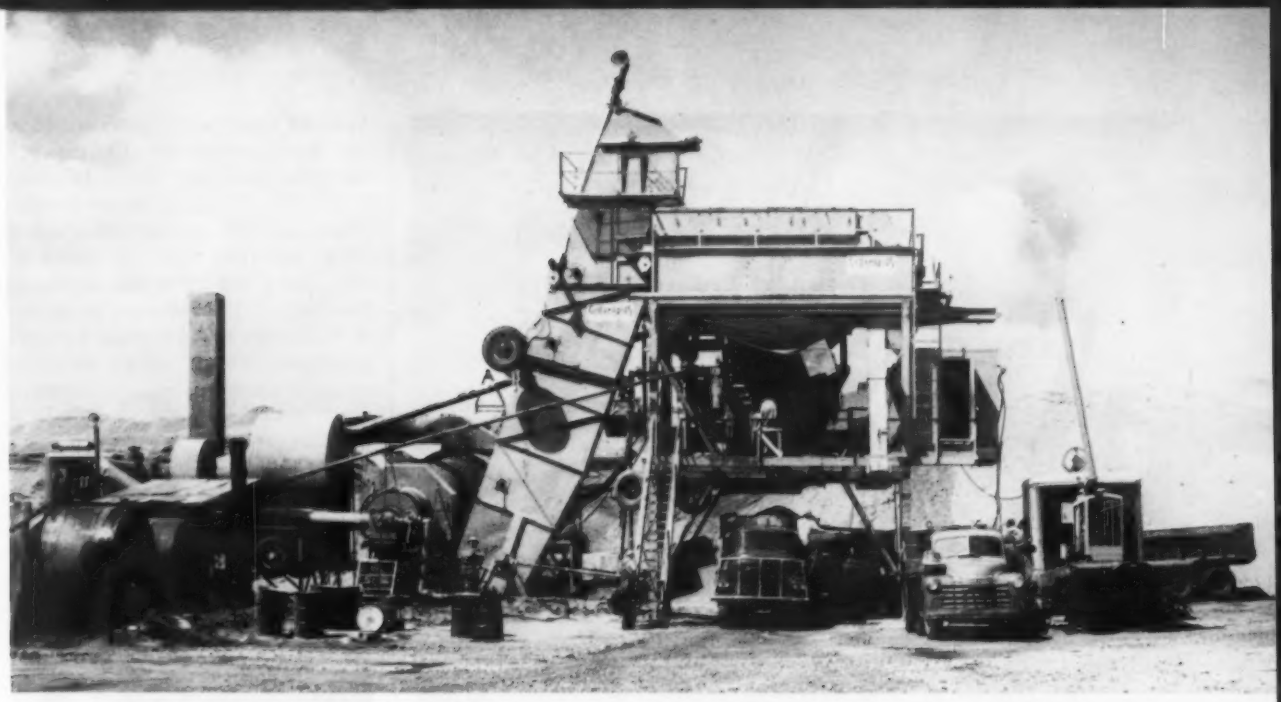


Electric power for the hot-mix plant was supplied by this GM Detroit Diesel 610 generator unit. Switch gear is located in the van mounted on the same trailer chassis.

A Michigan 280 dozer kept the crane in ready reach of aggregates for supplying the hot-mix plant (see also the accompanying layout sketch).



Two typical half-cross sections for the heavy-duty pavement section adopted by the Oklahoma state highway department for I-35 project here described. The chief variant is the stabilized base course depth, which was varied to suit foundation conditions.



Cedarapids Model G-60 (7,500-lb.) asphalt plant, as set up for the Broce Construction project here described.

MULTI-LAYER ASPHALT PAVING

Continued from page 141

consisted of pit run material specified to have a P.I. not exceeding 15. (A value being stepped up in quality on subsequent projects.) It was hauled in scrapers or trucks, spread with motor graders and compacted under close moisture control in layers not over 8 in. using pneumatic rollers. This part of the roadbed, as well as the grade left by the grading contractor, was test-rolled using a 50-ton rubber-tired compactor. Such test rolling was adopted recently in Oklahoma for the subgrade, subbase and base on heavy-duty pavements. This part of the roadbed, as heretofore noted, was built to varying thickness (3½ to 9½ in.) to compensate for the changing thickness design of the treated base layer to follow.

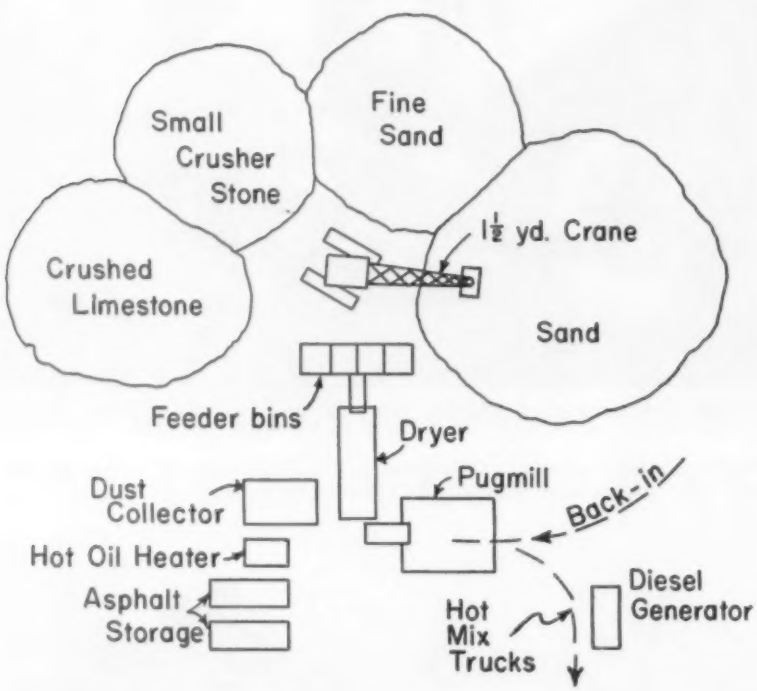
Treated Base. The treated aggregate base, also a relatively new Oklahoma feature, was constructed 6 to 12 in. thick. The contractor utilized a blend of three aggregates: a 3 in. maximum crushed limestone, a medium sand, and a fine sand. The mixture had an optimum moisture content of 7.2 percent including that furnished by the AE5 emulsion used as binder. Emulsified asphalt or MC2 cutback asphalt was used for the 1.8 percent bitumen content adopted for the design mix. Mixing was done

A Cedarapids paver placing binder course for Broce Construction Co.

The treated base material was prepared in this Eagle pugmill, where emulsion and additional moisture were added. Laydown by a Jersey spreader.

The three-compartment hopper supplying measured aggregates to the cold elevator, fed by a Northwest No. 6 crane.

Quartering a sample of black base material in preparation of a stability test mold on the Broce section of Oklahoma I-35.



How Broce Construction Co. arranged stockpiles so that a single crawler crane with clamshell bucket could load all four aggregates for various mixes into the proportioning bins for the cold elevator. (Pugmill used to mix treated base not shown.)

without heat in an Eagle pugmill. Jersey spreaders placed the treated mix for rolling in 6 in. layers.

The aggregate for the emulsion treated base material was required to meet the grading of either of the gradations, with a reduction in the minus 200 mesh, allowed in the stabilized aggregate base course specifications. Due to crushing operations the contractor elected to use the 3-in. maximum size.

The treated base was designed as a seal against capillary moisture and for definite stability values and other characteristics. Compaction was by steel and rubber-tired rollers, to a density specified at 95 percent of standard Proctor density.

The addition of the small amuont of emulsion in such base material is desirable, in the belief of Oklahoma engineers, primarily to reduce moisture fluctuations in the material. Thus, the base not only is stronger but retains its strength more uniformly. The small percent of emulsion is also proven to be an aid in setting up, and maintaining, density in a low P.I. or non-plastic material. Thus, due to the coating of the plastic fraction in the base material, regardless of the season of the year

or in the event of extended wet and dry periods, the strength of the material varies less than with untreated material.

Since Oklahoma requires plant blending of base material with moisture added at the plant, the emulsion was added at the pugmill and the material was spread by a spreader rather than a traveling mixer.

(Editor's Note: The Texas Highway Department has for a number of years, in several districts, added from 5 to 15 percent of emulsion to sprinkling water in the compaction of the top portion of the base. Thus, the treatment is applicable to both types of base operations.)

Black Base. Next came 5 in. of black base which was placed in two equal layers. This hot plant mixed material consisted typically of about 65 percent of 1½ in. crushed limestone and 35 percent sand, with 3.0 percent by weight of 85-100 penetration asphalt. A rolled density of 95 percent of the laboratory specimen was required. The densities obtained ranged to 98 percent.

The aggregate for the hot-mix black base was required to meet the specifications of the stabilized aggregate base course, 1½ in. maximum size, with the exception that the minus 200 mesh material was changed from 4-12% to 2-10%. A Hveem stability of 35 was required.

Binder and Surface. The 2½-in. binder course utilized 60 percent of 1½-in. crushed limestone, 20 percent sand and 20 percent fine sand in a typical design mix, with 4.4 percent of 85-100 asphalt. The 1½-in. surface course used a smaller crushed limestone and sand, with 5.5 percent asphalt. Rolled density of 92 percent of theoretical was specified for these layers, with readings of as high as 98 percent of laboratory density obtained.

Shoulders. The inner and outer shoulders were built up as part of the subbase work using select material, with compaction by small tractor-towed vibratory rollers. Shoulders were paved 7¾ in. thick with black base mix and given a single surface treatment. The treatment applied during the cool autumn employed AC-4, deemed best suited for the season.

Pavers and Plant. The black base

FOR FAST, ECONOMICAL

SURFACING OR REPAIRS, USE

A *McConnaughay* HTD MIXER

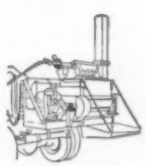
HTD MIXER
No. 10

Here are the mixers you need for fast, economical pavement repairs and small surfacing jobs... in any season... under wet or dry conditions. They are precisely engineered and rigidly constructed to handle on-the-job mixtures of asphaltic concrete, sheet asphalt, sand asphalt or mastic asphalt... hot or cold... at remarkably high production rates and lowest possible costs. Write for our folder on the complete line of mixers as well as for specifications and proportioning tables.

HTD MIXER No. 10
½ ton per batch

HTD MIXER No. 8
⅓ ton per batch

HTD MIXER No. 5
¼ ton per batch



HTD MIXER No. 4-T
⅓ ton per batch

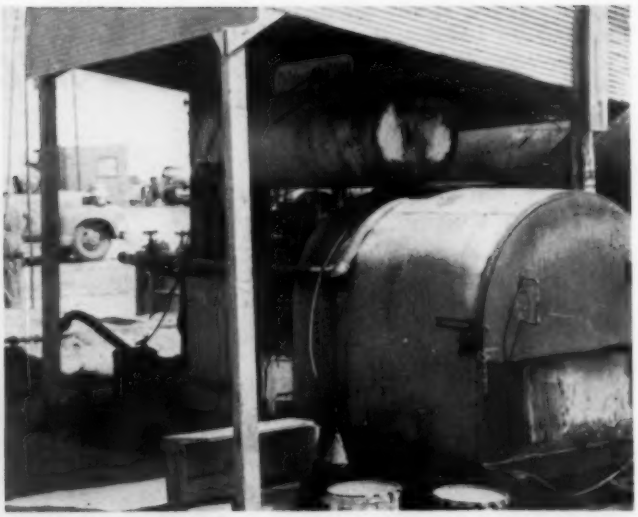
McCONNAUGHAY MIXERS, INC.—LAFAYETTE, IND.

National distributors: Asphalt Equipment Co.
3314 Cherry Lane, Fort Wayne, Indiana

Export Representative: William H. Schuelie, 440 E. 79th St., New York 21, N. Y.

... for more details circle 329 on enclosed return postal card

A 2½-in. binder course and two 2½-in. black base courses shown in place after pneumatic rolling. The black base and binder course using smaller stone were difficult to distinguish.



Childers hot oil heater as set up on project by Broce Construction Co.

and paving layers were placed by one Cedarapids paver and two Barber-Greene finishers. Placement was as a variable and often relatively high speed, geared to the plant production, there being no limitation of rate of paver travel in the Oklahoma work. A problem was the planning of lane strips. The pavers were set for 10 ft. or 13 ft., and at times made odd-width passes to complete the prescribed width.

The Broce organization prided itself on the accuracy and neatness with which the laydown work was done. Each lane was stringlined on the outside edge, even though a hot joint was employed. This was necessary due to the 6 in. overlap of the trailing finisher on some passes. Combined lane width of 39′ 7″, 38′, 24′ 6″ and 24′ were laid utilizing 10 ft., 12 ft. and 13 ft. screed widths.

A daily production of 2,000 to 2,400 tons of hot mix was maintained rather steadily. The asphalt plant was an automatic Cedarapids Model G-60 assembly with 7,500-lb. pugmill. Components included Hardy scales, a Childers D-100 hot oil heater, with a pair of GM Detroit Diesel 610 engines—one driving the dust collector, the other 150 kw generator unit on a trailer, powering the plant's electric motors.

The cold bins with proportioning feeder were served by a Northwest 41 crane with 1½-yd. clamshell bucket. An interesting feature (see sketch) was the stockpile arrangement. The four aggregate piles encircled the clamshell, with dozers shoving material over the crest of each pile toward the crane, where it spilled down within convenient reach.

Spreads aggregate from powder fine to 3″ depths.

Automatic Transmission operates forward or reverse without shifting gears.

The Good Roads "Handy" Aggregate Spreader is designed for smooth and accurate spreading of sand, slag, stone, gravel, calcium-chloride, etc., up to 1" in diameter—from powder fine to 3-inch depths.

Ideal for parking lot, street, road, highway construction and maintenance, it is available in 6 models for spread widths of 8, 9, 10, 11, 12, and 13 feet. Narrower widths can be accomplished by use of block-off plates.

For complete details see your local distributor, or write to:

Good Roads GOOD ROADS MACHINERY CORPORATION
MINERVA, OHIO

. . . for more details circle 306 on enclosed return postal card

Stockpile maintenance and handling were done by a Michigan 280 rubber-tired dozer, a Michigan 275 loader and a Cat D7 tractor. These machines worked slots for maximum dozing efficiency, and moved material up and over the pile to the crane in a manner which satisfactorily corrected any segregation.

Materials required in this project included 115,000 tons of aggregate and 836,000 gal. of emulsion for the treated aggregate subbase; 91,700 tons of aggregate and 4,320 tons of asphalt for the black base, with 36,400 tons of stone and sand, and 2,500 tons of asphalt for the binder and surface course. Also 84,000 gal. of AE5 emulsion was needed for tackcoating the subbase, base and binder layers (at 0.1 gal. per sq. yd.).

The project was field-managed for Broce Construction Company by LaVerne Rogers and Glen Whealy. For the Oklahoma state highway department, the pavement design was developed by Burt McCaleb, design engineer, in cooperation with G. E. McCamy, materials engineer, Paul Barnes, Ass't. materials engineer and R. A. Helmer, research engineer. Neil Chesnutt was resident engineer under the Perry division; R. A. Ward assistant division engineer, construction, C. O. Brewster division engineer. G. H. Brittle is chief engineer.

Other I-35 Designs

The afore-described project is one of three starting at US 64, west of Perry and extending south to the Cimarron River. Broce has the next approximately 6.5-mile section. The pavement is 4 in. of asphalt concrete on 5 in. of emulsion treated base, of the same type included in the first contract. It was laid on a variable thickness of stabilized aggregate base course of 6 to 16 in., and subbase material from 0 to 9½ in. thick.

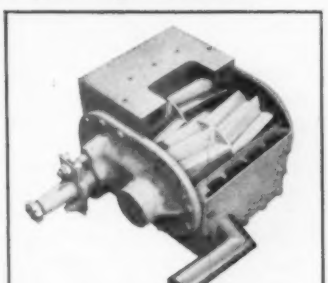
The next 6.4 mile section to the south is under construction by Peter Kiewit & Sons'. It is similar to the previous Oklahoma Standard section of 4½-in. asphalt concrete on a 10-in. stabilized aggregate base. The difference is that characteristics of the 10 in. of subbase material were changed to insure a CBR of 20 as compared to the previous attainment of a CBR of 8.

The two somewhat lighter designs used for these two projects are constructed in the form of experimental control sections, so that their performances under near-identical traffic conditions could be observed.

The Oklahoma state highway department engineers seemingly are well pleased with the hot-sand asphalt base. A 10-mile section incorporating this kind of base was constructed in 1958 by Dahlgren Construction Company, near Clinton, Oklahoma, on I-40. In view of the performance of this segment and several similar ones on the primary system, the Oklahoma department late in 1960 awarded 18 miles of projects using hot-mixed sand-asphalt. The design is 4 in. of asphalt concrete on 8 in. of sand-asphalt base on a variable subbase. These projects are also on I-40, between Clinton and El Reno.

Etnyre FX-500... the only distributor with a heat-jacketed pump case!

400 gpm heat-jacketed pump. Engine exhaust is directed into jacketed pump case which surrounds pump impellers, then into intake valve above pump after passing through ducts in pump case. Suction on top and discharge at bottom make pump self-draining — no low points to trap material. Eliminates fire hazard of flame heating from burner.



OTHER FX-500 QUALITY FEATURES

All deluxe equipment . . . the very best of Etnyre's famous Black-Top line. Engineered for maximum payload. Simple and safe; efficient and economical.

Hard aluminum and stainless steel jacketing. Insulation is 2" fiberglas with asbestos molded blocks for spacers to maintain 2" without compression. Aluminum fenders, flaps, safety-tread cat walk, and safety-tread operator's platform. Full circulating spray bar that turns up 92° for complete valve drainage and NO POSSIBLE DRIP! Many other exclusive features.

For maximum payload . . . for maximum profit . . . investigate the Etnyre FX-500 today. E. D. Etnyre & Co., Oregon, Ill.

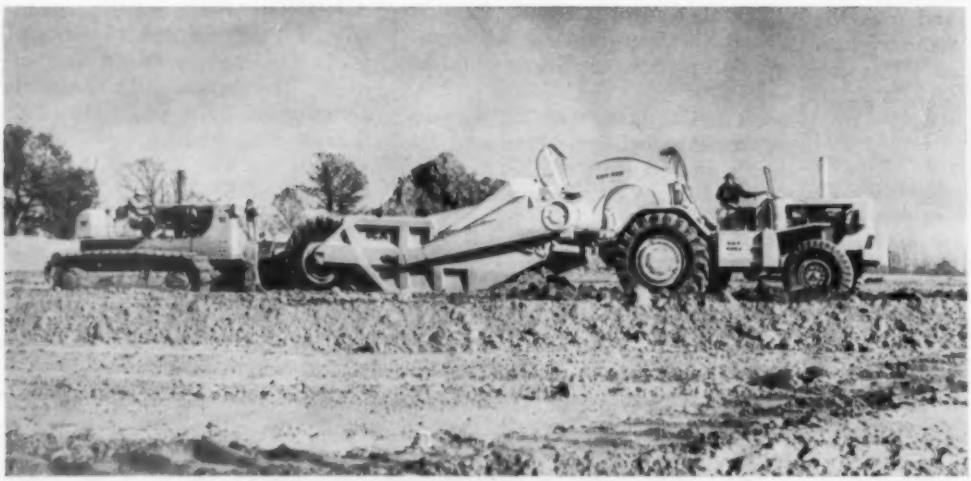
SEE YOUR ETNYRE DEALER

ETNYRE
BITUMINOUS DISTRIBUTORS

. . . for more details circle 293 on enclosed return postal card

NEW PRODUCTS

Listed here are reviews of new and improved equipment items, selected to aid our readers in purchasing. See reader service numbers on enclosed postcard.*



Caterpillar's new 630A—Four wheels and lowbowl design.

Power Shifted Wheel Tractor-Scrapers

Two new, 420 maximum hp. wheel tractor-scrapers, featuring an exclusive torque divider power shift transmission, have been announced by Caterpillar Tractor Co.

Designated the 630 Series A, the four wheel series, and 631 Series A, the two wheel series, both scrapers are of lowbowl design and have a struck capacity of 21 cu. yd. and a heaped capacity of 28 cu. yd. The new tractors are powered by a completely new design, four-valve-in-head diesel engine that has a maximum rating of 42 hp. and a flywheel rating of 335 hp. The 630A has a top speed of 41 mph.; the 631A, 31mph.

To shift gears, the operator need only move the selector lever to one of three speed range positions. Within each range, the most appropriate of three drives is automatically selected to meet changing power requirements. The transmission combines planetary gear groups with a torque converter. The three automatically selected drives are: torque divider drive, direct drive and over-drive. A dash-mounted indicator shows the operator when to shift to the next higher speed range.

Individual porting of intake and exhaust valves is a special feature of the four-valve-in-head diesel engine. By connecting each valve directly to the manifold the engine's breathing is reported greatly improved. Cooling of intake air improves the engine's performance. An aftercooler makes intake air more dense after passing through the turbocharger. The dense air results in a greater amount of oxygen in the firing chamber.

Scrapers are operated by an air actuated, double drum cable control. The unit is driven by a live power shaft directly off the engine, providing full cable control whenever the engine is running. Cable control breaks have a large capacity and precise modulation, reported to result in more accurate scraper control.

The 631 tractor-scraper utilizes a full hydraulic, two-cylinder steering system with follow-up linkage that gives the operator realistic feel of the machine. The full 90 deg. turn possible may be made without reversing the cylinders.

Steering gear of the 630 incorporates a hydraulic steering cylinder mounted in a protected position on the tractor frame and con-

Cat's 631A—420 hp. and 31 mph. for a valve-in-head diesel.

*To readers outside of the United States—postal rules forbid use of business reply cards outside of the U.S. Please write to us listing the numbers, month and name of magazine, and mail with your name and address to Inquiry Dept., Roads and Streets, 22 W. Maple St., Chicago 10, Ill., U.S.A.

nected directly to the Pitman arm. This arrangement is reported to permit absorption of all road shock outside the steering gear rather than in the shaft.

Oil pans of both tractors are removable without pulling the engine. All engine accessories can be repaired or replaced with the engine still mounted in the tractor. The 631 tractor dash can be swung out to give access to the starting engine, air compressor and water pump. Radiator, side plates and radiator fan are removable as a unit.

Special features designed to improve operator comfort and efficiency are fully adjustable Torsionflex seat, full width air vent located at the bottom of the windshield, steps on both sides of the tractors and an uncluttered compartment.

Caterpillar Tractor Co., Peoria, Illinois

For more details circle 101 on Enclosed Return Postal Card.

Back-Up Bull Horn

A new alarm for trucks that must often back up has been announced by the E. D. Bullard Co.

Designated the Bull/Horn it is designed for heavy tractor equipment. The device is mechanical. This is so the device can operate when the motor is not running. The manufacturer reports that the horn meets Army Corps of Engineers standards.

E. D. Bullard Co., Sausalito, Calif.

For more details circle 158 on Enclosed Return Postal Card.

Transistorized Warning Light

The new No. 610-FS Dietz Visi-Flash transistorized warning light has been designed to increase both the day and night effectiveness of cones in traffic control work.

A theft-proof feature is the 30 in. steel chain attached to the battery case cap. When the unit is placed in a traffic cone, the chain hasp is ramset to the pavement, making the cone and flasher theft-proof. The flag staff socket welded to the double-faced head permits the use of a warning flag to increase daytime effectiveness. Producing 8 beam candlepower through 4 in. optical lenses, signal life is 400 hours, using four ordinary "D" flashlight batteries. The signal pulsates 65 times per minute. Snap-out lens retaining rings simplify bulb replacement. Batteries are loaded in the same manner as an ordinary flashlight. Pressing a push switch on the side of the housing turns the flasher on and off, without removing it from the cone.

Dietz Warning Light

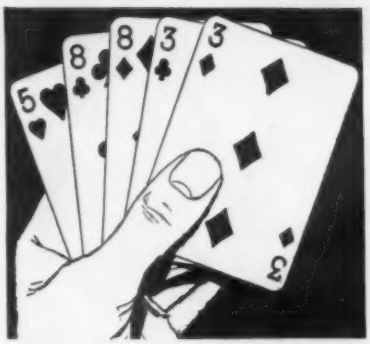
R. E. Dietz Company, 225 Wilkinson St., Syracuse, N. Y.

For more details circle 103 on Enclosed Return Postal Card.

This Rex horizontal truck mixer mounted on a Rex off-highway diesel carrier permits loads in excess of 15 cu. yd. When filled to capacity the total weight of the carrier mixer, including 500 gal. of mixing water, weighs over 50 tons.

For more details circle 102 on Enclosed Return Postal Card.

POKER? Play to win!



How would you play this hand?

You'll be the high hand before the draw about 3 times out of 5, but the odds are roughly 12 to 1 against helping on the draw. Odds are better than even somebody will beat you. Don't open. Don't call. Tough? Yes, but be patient...and win.

Here's a sure winner from FORD:

Ford pays half your fuel bills for a full six months (or 400 tractor hours) on the purchase of any new Ford or Fordson diesel tractor.

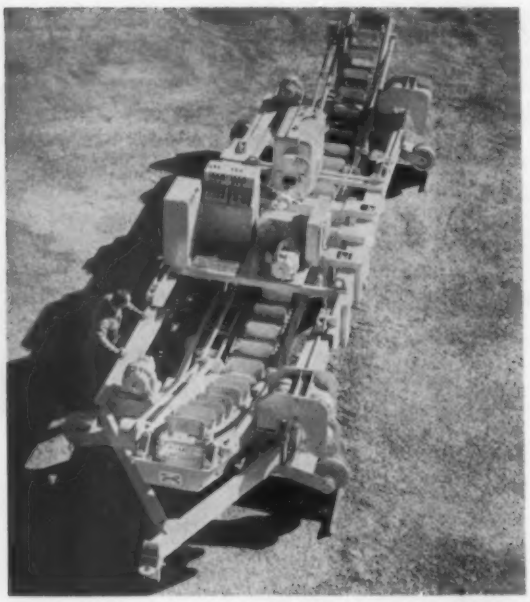
This offer, made possible by the amazing fuel-saving performance of these low-priced diesel tractors, expires March 31, 1961.

No "hidden" price increase... no tricks of any kind. See your Ford Tractor Dealer for all the money-saving details!

Tractor and Implement Division, Ford Motor Company, Birmingham, Michigan

Ford TRACTORS EQUIPMENT

... for more details circle 296 on enclosed return postal card



Blaw-Knox Self-Widening Subgrader Equipped with power & push-button control.

Self Widening Subgrader

Equipped with power self-widening and a centralized push-button control panel, a new subgrader designed to increase accuracy has been introduced by Blaw-Knox Co.

Precision cutting depth from 0 to 12 in. and an easy-to-apply attachment capable of deeper penetrations are combined with a 226 cu. in. gasoline engine with electric starting. Power widening of the subgrader is in 4 ft. increments from 12 to 28 ft. governed through the centralized panel of push-button electric and hydraulic controls. The automatic control system sets frame, conveyor, and cutter bowl—up to a 4 ft. adustment. Beyond the 4 ft. adjustment, it is necessary to add sections to extend the conveyor and cutter unit.

The Model SWS-200 subgrader has a standard cutting depth of 0 to 12 in., the ability to adjust 2 in. above the top of 12 in. form depth, and 14 in. of height adjustment at each end truck —right, left, and simultaneously. All adjustment is through synchronized electric power, which permits the operator to set depth of cut independently to right or left of transverse line of operation and maintain an accurate level depth of cut. This engine operates a variable frequency alternator and heavy duty, high torque AC motor.

Blaw-Knox Co., Construction Equipment Div., Mattoon, Ill.

For more details circle 104 on Enclosed Return Postal Card.

Self Contained Asphalt Plant

An asphalt plant that is self-contained and will produce 30 to 40 tons of hot-mix asphalt per hour is being manufactured by the Wylie Mfg. Co.

The plant stands 238 in. high, measured 406 in. long and 96 in. wide. Weighing approximately 28,000 lb., the unit contains a rotary dryer, pugmill, batching hopper, material hopper, elevator, dust collector and a metering system, mounted on a single frame. The material hopper has a low charging height of 104 in. Direct charging of aggregate from hopper into dryer eliminates cold material elevator and clogging of chutes. The single frame design requires no concrete piers or foundations, other than concrete pads or timbers under four corners of the lower frame. There is no erection required other than raising hinged elevator sections.

Wylie Mfg. Co., Inc., 640 N. Meridian, Oklahoma City, Okla.

For more details circle 105 on Enclosed Return Postal Card.

End Dump Trailer

A new end-dump semi-trailer available in either single or double axle models and from 18 to 30 tons is now available from Challenge Cook Bros.

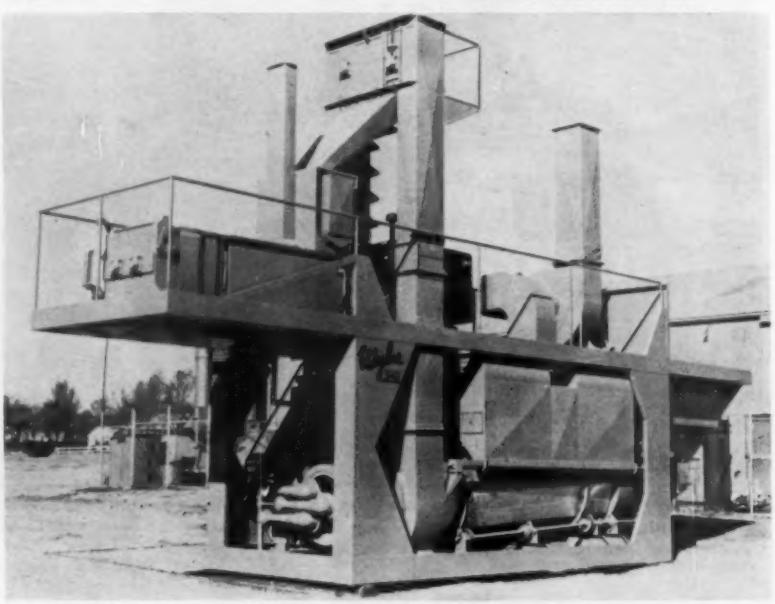
The "Stabilift" can be used for ordinary dump and fill work, stock-

C/CB "Stabilift"

piling, and spreading. It is also suited for working with asphalt and concrete paving machines.

Challenge-Cook Bros. Inc., 3334 San Fernando Rd., Los Angeles 65, Calif.

For more details circle 106 on Enclosed Return Postal Card.



Wylie's Asphalt Plant

Cement Transport

A new model of the Baughman PMCT-1 cement transport is now being offered by Baughman Manufacturing Co., Inc.

The PMCT-1 is equipped for high speed self-unloading by both pneumatic and mechanical means, thus providing the versatility needed to meet unloading requirements for most jobs. The mechanical system can be used to discharge cement into pit or on a conveyor at approximately 2,000 lb. per min. The air discharge method, used when the cargo must be elevated, can unload at a rate of about 1,300 ft. per min. Cement can be raised to a height of 100 ft. when the pneumatic system is used. A heavy-duty 9-in. auger that runs the full length of the body gives thorough clean-out regardless of transport position. No residue is left to cake or harden states Baughman. A

Baughman's Cement Transport

patented air cell over the auger assures easy starting; auger is synchronized with the air stream to prevent over-feeding while using the air discharge system. An effective check valve prevents cement from backing into blower. Power for both auger and blower is supplied by an efficient auxiliary engine.

Baughman Mfg. Co., Inc., Jerseyville, Ill.

For more details circle 107 on Enclosed Return Postal Card.

Automatic Grade Control

Designed to maintain grade level automatically from an accurate base, wire, form or other device, a new automatic grade control for bituminous paving has been introduced by Blaw-Knox Co.

Complicated electronic and mechanical adjustments are eliminated by the new device. The device may be used for short shoe adaptation for joint matching of a previously laid mat, with a roller follower device for pre-determined grade information or long shoe adaptation to average previously cut variations. The company says the control can also be used with a microswitch proximity device to obtain grade information from a previously run music wire grade.

Blaw-Knox Co., Construction Equip. Div., Mattoon, Ill.

For more details circle 108 on Enclosed Return Postal Card.

Only with Link-Belt Speeder Diesel Pile Hammers

ALL HAMMER CONTROLS AT ONE MAN'S FINGERTIPS!

you start — *with the glow-plug and pressure fueling*
you drive — *with control from idle to full power*
you stop — *with safe, from-the-cab control*

Now — forget about the high cost of a separate throttle operator. Link-Belt Speeder self-contained diesel pile hammers are *one-man operated from the cab* — both crane and hammer.

Your operator starts in coldest weather or in soft ground . . . with a flip of the glow-plug switch. No dangerous climbing of the leads . . . no fussing with ether.

This same man controls the amount of fuel injected — keeps ram stroke at maximum. He can throttle it down to idle . . . or drive the pile with maximum power output.

He has fingertip, hydraulic-smooth control of unique Tri-Power cycling — pile preloading, high impact and two-way explosion. All keep the pile in motion *longer*.

Choose from 3 hammers: up to 7,500, 18,000 or 30,000 ft-lbs per blow — *double* the number of blows per minute of competitive diesel hammers. No job-slowing boilers, compressors or auxiliaries!

115-59N

Ask your Link-Belt Speeder distributor for free Diesel Pile Hammer Bulletin No. 2582-A, or write, LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA.

LINK-BELT SPEEDER

Also builders of a complete line of shovel-cranes . . . ½- to 3-yd., 8- to 75-ton capacities.

. . . for more details circle 321 on enclosed return postal card

GMC's Tandem Trucks

Tandem Trucks Conventional Cabs

A new family of easy to enter and easy to service tandem trucks with 105 in. conventional cabs has been added to GMC's line of construction-type vehicles.

Four basic models are available: the WV5000; WA5000; WV5500 and the WA5500. The WV units have vacuum brakes while the WA versions come with air brakes. Standard gross vehicle weights, truck, body and load, are 35,000 lb. for the W5000 and 43,000 lb for the W5500. The vehicle weight is held to a minimum to permit the hauling of increased payloads. Eight rear driving wheels, with twin axles linked by inter-axle differential, give the traction and floatation needed to haul big loads over rough terrain. Low overall cab height provides maximum clearance under tipples and other overhead loading structures.

All models are six cylinder and all have spark plugs located on top of the engine for ease of maintenance. The hood over the engine swings up to nearly 4 ft. to expose engine parts fully.

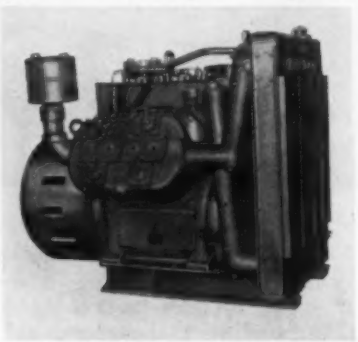
GMC Truck & Coach Div., 660 S. Boulevard East, Pontiac 11, Mich.

For more details circle 109 on Enclosed Return Postal Card.

Air Compressor

New power and new size is offered in the Model WFO air compressor introduced by Gardner-Denver Company.

Offering new advancements in air compressors, the WFO is the highest hp machine available from Gardner-Denver Company in the vertical W-type configuration. This 250 hp compressor operates at 1160 RPM with a piston displacement of 1395 CFM, at maximum pressure of 125 PSI. The WFO water cooler, two-stage compressor has aluminum pistons and high speed valves. Complete compressors



Gardner-Denver Compressor

are available with Super V-belt drive, built-in motor or direct connected motor.

Gardner-Denver Co., Quincy, Ill.

For more details circle 110 on Enclosed Return Postal Card.

Side Tipping Bucket Dumps Three Ways

A world patented invention, the Libu threeway dump bucket reported to boost loader capacity and cut loading costs has been announced by the Libu Shovel Co. of Stockholm, Sweden.

The new machine, which makes possible mechanical loading in confined spaces, differs from the conventional loaders in that it can be tilted as desired out to the right or left as well as forward. The side tipping function is based on the principle of the open sided bucket swivelling about a centre pivot. If its loading is properly organized, the distance the tractor travels will be only 2 or 3 yd.; this reduces drastically driving and turning, which produces valuable shortening of cycle time, reports the manufacturer. Savings to wear of tracks and wheels as well as in fuel consumption and engine fatigue, will add to the cost cuts made possible through the capacity increase. The space required for the loading operation will in theory be

Libu Threeway Bucket

restricted to the combined width of the loader and the conveyance. In practice, an addition of 10 percent of this dimension is sufficient for loading operations to take place.

Swedish Information Office, 8 E. 69th St., New York 21, N.N.

For more details circle 111 on Enclosed Return Postal Card.

Rubberized Asphalt Kettle

A new KE-RA-20 rubberized asphalt kettle designed to apply hot material directly into the joint has been announced by Aeroil Products Co.

The material is indirectly heated by heat transfer oil. A mechanical agitator is provided to mix materials. The unit will work right up to curbs,

Aeroil Asphalt Kettle

bridges and other similar obstructions. A complete range of the kettles is available in sizes from 18 to 75 gal.

Aeroil Products Co., Inc., 9 Wesley St., South Mackensack, N. J.

For more details circle 112 on Enclosed Return Postal Card.

Mortar Hardness

A new cement and concrete laboratory instrument for measuring the rate of hardening of mortars sieved from concrete mixtures has been announced by Soiltest, Inc., Chicago.

Called the Mortar Penetrometer, the instrument operates

Soiltest Mortar Hardness Test

by means of penetration needles to determine the rate of hardening. Penetration force is measured by the force exerted to penetrate a mortar sample one inch. The penetration force is measured by the compression of a calibrated spring inside the instrument. Graduations are to one pound. The device may be used to determine the effects of variables such as temperature, cement, mix design, additions and admixtures upon the hardening characteristics of concrete. Six penetration needles ranging in end area from 1 to 1/10 sq. in. are supplied with the device.

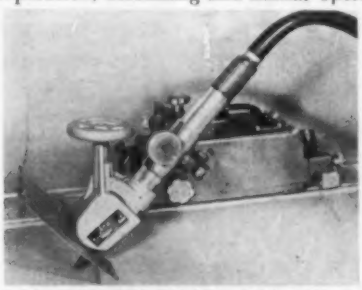
Soiltest, Inc., 4711 W. North Avenue, Chicago 39, Ill.

For more details circle 113 on Enclosed Return Postal Card.

Automatic Travel Torch

The Arcair Co. has announced the development of a new T-5 semi-automatic Arcair Torch.

The T-5 model was designed to produce smooth, machine-like groove or bevel in heavy plate. Its function is gouging for weld preparation, deseaming and similar operations. By



Arcair Semi-Automatic

square-butting two plates and gouging along the seam, a smooth, uniform "U" groove can be produced. The new unit can be mounted on a standard cutting machine. It is provided with a 32 pitch rack for that purpose. Special pitch racks are available for other than 32 pitch machines. The torch melts metal with an electric arch, the molten metal being blown away with a jet of compressed air. The unit is designed to use electrodes ranging from 1/4 to 5/8 in.

Arcair Co., P. O. Box 431, Lancaster, Ohio

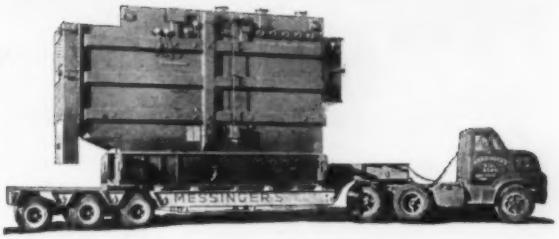
For more details circle 114 on Enclosed Return Postal Card.

TRANSPORT TRAILERS

OVER THE ROAD . . . ON THE JOB

PROVED

RUGGED • DEPENDABLE



TRIPLE-AXLE MODEL GTX

Positive equalization and distribution of weight on each axle is assured through this exclusive design. Six dual wheels with capacity of 30 through 60 tons. Flat or drop deck. Axles are tubular in type with heavy duty heat-treated alloy steel spindles ground to size to fit heavy duty tapered bearings. All axles are of standard production and have camber for longer tire life.

BUILT BETTER... TO LAST LONGER... TO GO FURTHER!

MODEL GTRY

Triple-axle, with or without removable gooseneck. Capacity 20 through 100 tons.

MODEL XTT

Tandem axle tilt trailer (tow type), capacities 13 through 20 tons.

MODEL GPX

Tandem axle. Capacities 16 through 40 tons. Drop deck or flat deck.

MODEL PTX

Heavy-duty tandem axle with adjustable bolsters. Telescopes from 16' to 30' from tractor.

MODEL PXO

Heavy-duty self-loading tandem axle oil field float.

MODEL GXTT

Gooseneck type, tandem axle tilt-trailer. Capacities 14 through 22 tons.

"TRANSPORTATION ENGINEERING A SPECIALTY"

TRANSPORT TRAILERS pledge to "design better units to convey heavier loads farther at the lowest operating cost, longer."

TRANSPORT TT TRAILERS INC

CEDAR RAPIDS IOWA, U.S.A.

. . . for more details circle 341 on enclosed return postal card

Case 750 Crawler—Diesel with Terromatic

New Crawler Tractor

A new 750 Crawler tractor that went into production December 1, 1960 was announced by J. I. Case Co. The new tractor will be introduced on film at the Hawaiian World Premiere and will be on display at dealer open houses which are being held through the month of February.

The new crawler should be useful in those areas where operations vary, because of its power, maneuverability and ease of operation. The new production rig features a 301 cu. in. Case built diesel engine; is equipped with the Terromatic transmission and a "load-sensing" torque converter that produces up to 23,000 lb. push-pull effort. Split second power shifting, power steering and independent power control of each track are also featured in this new machine. Other features of the 750 Crawler include finger tip pressure hydraulic controls, self-lubricating power track rollers, accessibility to oil and fuel filters and the electrical system, plus the introduction of a new concept of servicing with simple hand tools. New hydraulic track adjustment was specifically designed for faster, easier daily maintenance.

J. I. Case Co., Racine, Wis.

For more details circle 115 on Enclosed Return Postal Card.

Lube Oil Filter Element

A new lubrication oil filter element featuring a considerable increase in filtration efficiency without a loss in service life has been announced by Caterpillar Tractor Co.

The new element, known as 7M 3800, is a paper element which removes greater percentage of impurities than was possible with the efficient 9F 6700 element, states Caterpillar. The outward appearance and dimensions of the new filter element are unchanged. The degree of impurity removal is found in construction of the filtering paper. A new feature of the element is "deep grooving" of the filtering paper to maintain proper fold separation. The unit is standard in all track-type tractor and Traxcavator models and motor graders. It is also used in all Cat diesel engines, with the exception of the D353, D337 and the D326.

Caterpillar, Peoria, Ill.

For more details circle 116 on Enclosed Return Postal Card.

THE YEAR'S BIG NEWS in TRANSITS

The Finest Contractor's Transit You Can Buy . . . and . . . AT SUCH A LOW PRICE!

W-K American-made Contractor's Transit No. 32 $460 with tripod

If you're economy-minded AND value-minded, too, here's your transit! We've cut no corners in giving it the precision, ruggedness and features Contractors and Builders want! 24-power internal focusing telescope has finest achromatic coated lens system—5' close focus. Telescope plunges through standard for ease in sighting ahead or back without resetting. Center is special alloy steel with all other parts tough cast Bronze or Brass—no die castings. Features include: ball bearing telescope axle, 2 plate levels, clamp and tangent for circle *and* center, double centers. Normally plain crosswires, but stadia can be installed. Complete with tripod, mahogany carrying case, plumb bob, magnifier, trivet pins. Weight only 13½ lbs.

SO DURABLE AND RUGGED IT SHOULD REQUIRE LITTLE MAINTENANCE DURING A LIFETIME OF SERVICE

Call or write for full details in Bulletin RS-21

OUR 53rd YEAR

WARREN-KNIGHT

136 N. 12th St., Phila. 7, Pa.

. . . for more details circle 320 on enclosed return postal card

POT HOLES PUTTING HOLES in your BUDGET?

SAVE TIME, MONEY and LABOR with

KOTAL

All Weather Processed Bituminous STOCKPILE MIX

- Immediately Available
- Workable in Any Weather
- Consolidates Readily Under Traffic
- Stretches Your Repair Period Over Entire 12 Months

WINTER WEATHER IS HARD ON ROADS

Repair them now and keep them repaired through the winter with Kotal processed stockpile mix.

For information regarding your nearest producer or franchise areas available — write to

KOTAL Company

119 Summit Avenue • Summit, N. J.

. . . for more details circle 319 on enclosed return postal card

Cab-Over-Engine Truck

New 90 in. BBC trucks, engineered to maintain conventional-truck accessibility and interior cab spaciousness while increasing load space, are being introduced to the heavy-duty trucking industry by Kenworth Motor Truck Co.

Maintaining a 90 in. dimension from the front bumper to the back of the cab, the S-900 series utilizes the standard Kenworth conventional cab, which has simply been moved forward and raised. Ample room is provided for driver and rider. Kenworth's exclusive "Unitglas" front-end—a one-piece fiber glass assembly encompassing the hood,

Kenworth's Cab-Over-Engine

radiator shell and fenders—tilts forward, exposing the engine, its accessories and the cooling system. Further accessibility is provided by the low five-inch-high tunnel on the cab floor, equipped with quick release fasteners. Accessibility to the right side of the engine near the starter is achieved by an easily removable cover.

Because of the unit's short length and tight turning radius, the unit may be used in the transit mix industry, for use as a highway dump truck, and in other specialized fields.

Kenworth Motor Truck Co., Beautmont & Hohman, Inc., Central Bldg., Seattle 4, Wash.

For more details circle 117 on Enclosed Return Postal Card.

Single Impeller Portable

Two new Portable Primary Crushing Plants have been announced by Iowa Mfg. Co.

They are the 4336 and 3026 single impeller impact breakers with vibrating grizzly feeders, compact, efficient units which give top production. Their simple design and fewer working parts mean less wear and maintenance. These units are highly portable with only a minimum of disassembly necessary to meet road weight limits. The 4336 has a capacity of 200-400 tons per hour and the 3026 is rated at 150-250 tons per hour, capacities depending on material characteristics and size of product. The breakers have heavy hot-rolled steel side plates protected by thick abrasion-resistant manganese steel liners.

Iowa Portable Crushers

Iowa Mfg. Co., Cedar Rapids, Iowa

For more details circle 118 on Enclosed Return Postal Card.

Rotary Air Compressor

A new 125 cfm rotary portable air compressor has been announced by Le Roi Div. of Westinghouse Air Brake Co.

The new machine is powered by a D226 wet sleeve engine. The 53 hp. engine features stellite exhaust valves and valve seat inserts with valve rotators. At 1600 rpm the slow-turning engine reduces both engine and compressor parts wear, reports the manufacturer. Diesel and utility models of the new 125 rotary are also available. The diesel version is powered by a GM 353 engine. The utility model, designed for the requirements of cross truck bed mounting, is powered by the Le Roi engine.

Le Roi Rotary Compressor

Le Roi Div., Westinghouse Air Brake Co., Sidney, Ohio

For more details circle 119 on Enclosed Return Postal Card.

Low Bed Semi-Trailers

A line of lightweight Low Bed Trailers using High-Strength "T-1" steel or equivalent, has been announced by Transport Trailers, Inc. Trailers ranging in capacities of 30 tons and up, with tandem and triple axle running gear assemblies are now available in high strength steel.

Transport Semi Trailers

Weight reduction is made possible due to high-strength steel providing nearly 3 times the strength of ordinary steel, states the manufacturer.

Transport Trailers, Inc., Cedar Rapids, Iowa

For more details circle 120 on Enclosed Return Postal Card.

TRUCO® DOES IT AGAIN!

80% cost reduction in airport runway lighting by installation of pancake lights

Above: Drilling holes for light units.
Left: Cutting slot raceways for wiring.

Truco "pancake" diamond drill on Truco Model G, gasoline powered, truck-mounted drill rig cut holes for light units 6" dia. x 1" deep. Truco Concrete Saw with 14" Truco diamond blades sawed miles of slots for wiring raceways in both bituminous and portland cement concrete runways. Even greater savings now possible using new Tru-Vac® Vacuum Pad to anchor drill rig in seconds. Write for our new Catalog.

TRUCO

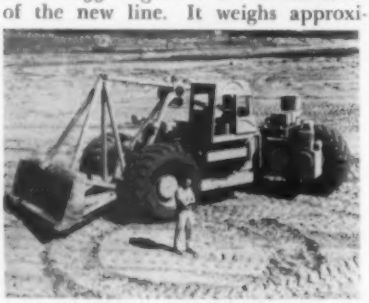
MASONRY DRILLING DIVISION
WHEEL TRUEING TOOL COMPANY
176-3200 W. Davison, Detroit 38, Mich. • 575 Langlois, Windsor, Ont.

. . . for more details circle 344 on enclosed return postal card

Electric Tractor Line

A completely new line of "Pacemaker" diesel-electric tractors designed for heavy-duty pushing and dozing has been announced by R. G. LeTourneau, Inc. The new tractors are all-wheel drive machines with individually powered LeTourneau Electric Wheels for propulsion. In this system each wheel has its own DC electric motor and gear reduction built inside the rim. Electric generators are direct coupled to the machines' diesel engines to power the motors.

A three-wheeled tractor designated Series K-53 Tug-Dozer is the "smallest" of the new line. It weighs approxi-



LeTourneau's Tug-Dozer

mately 80,000 lb. is powered by a 420 hp diesel engine, and rolls on 75 in. dia. tires. A modification of this machine, the Series K-53F, is equipped with 89 in. tires and is intended especially for operation in sand and other areas where high flotation is necessary. All of the new tractors feature the same power and speed for either direction of travel; electric powered steering; and maneuverability, particularly in the three-wheel units. The individually powered Electric Wheels maintain an almost continuous level of tractive effort despite variations in wheel loading due to turns or to difference in traction from wheel to wheel.

R. G. LeTourneau, Inc., 2399 S. MacArthur, Longview, Texas

For more details circle 121 on Enclosed Return Postal Card.

Heavy Duty Electric Plant

A new heavy duty electric plant with a dual rating of 85KW stand-by and 75KW continuous duty has been introduced by the Kohler Co. It is available in all standard voltages, in models for both gasoline and gas-gasoline operation, in radiator-cooled or city wa-

Kohler Electric Plant

ter-cooled models, and with either remote or push button starting.

The new plant replaces a former Kohler plant of 75KW capacity and is powered by a heavy duty industrial type engine offering more economical operation. Of 8-cylinder V-type, the engine develops 168 horsepower at 1800 RPM. The revolving field, 12-lead reconnectible generator is Kohler designed and Kohler built and has a direct connected exciter with 24 volt cranking wingings to ensure higher cranking speed and more positive starting. Standard equipment includes automatic voltage regulator, anti-Dieseling device for gasoline models, electric solenoid gas shutoff valve for gas models, low oil pressure and high water temperature cutouts, and Kohler's new plant-mounted combination controller and instrument panel.

Kohler Co., Kohler, Wis.

For more details circle 122 on Enclosed Return Postal Card.

Traxcavator Cabs

A wider field of vision, with its accompanying advantages, is provided by newly designed Vu-All Cabs developed by Crenlo, Inc., for use on Caterpillar Traxcavators.

Vertically mounted to minimize dust collection, the heavy glass windshields are tinted and shatter-proof. Heavy-duty steel—including 12-gauge body panels and 16-gauge double walled doors—is used throughout for durability and operator protection. Operator comfort is improved by a swinging

Crenlo's Traxcavator Cabs

rear window and doors that can be held open for ventilation. An acoustical ceiling reduces noise level and insulates against cold and heat.

Engineered to accommodate all combinations of hydraulic control valves without modification, Vu-All cabs are reported easily installed and removed from Traxcavators They are built to facilitate operation of Traxcavator controls.

Crenlo, Inc., 1600 Fourth Ave., N.W., Rochester, Minn.

For more details circle 123 on Enclosed Return Postal Card.

Rippers for Motor Graders

Heavy duty rear-mounted, hydraulically operated rippers for Caterpillar No. 12 and No. 14 motor graders are the latest addition to American Tractor Equipment Corporation's line of ATECO rock, pipeline and general utility rippers.

Especially designed for the No. 12 and No. 14 graders, the new ATECO rippers are mounted on the rear of the grader frame where the weight of the engine and final drive permits maximum down pressure on the ripper points. Rear mounting also retains steering control, improves traction, and keeps drive tires on smooth rather than ripper material. The tool beam is controlled by two hydraulic cylinders; standard tool beam will take up to 5 deep ripping shanks. An optional "do-all" tool beam will take either 5 ripping shanks or up to 9 scarifier shanks for shallow ripping. Standard ripping shanks for the No. 12 will rip to 14 in. depth; optional, 18 in. For the No. 14,

ATECO Rear-Mounted Rippers

standard shanks rip to 13 in. with an optional shank for 17 in. depth. Scarifier shanks rip to 8 in. on the No. 12 7 in. on the No. 14. Straight or curved ripping shanks and straight scarifier shanks are available. Replaceable points are offered in either heavy duty or general purpose designs.

American Tractor Equipment Corp., San Leandro, Calif.

For more details circle 124 on Enclosed Return Postal Card.

Dual Pressure Tank

A new steel dual pressure tank-trailer with 62,000 lb. shelf full payload designed especially to transport and discharge a wide range of powdered and granular materials, has been announced by the Fruehauf Trailer Co.

This single compartment steel tank has 4 bottom hoppers which can successively unload such materials as cement, fertilizer components, grain, ammonium nitrate, ammonium sulfate, most commercial salts, borax, gypsum, dolomite and pebble lime. The company explains that with pressure differential type units such as these, the granular or beaded material is handled pneumatically by a pressure of volume air pressing the material downward and while this force is being applied from above, a lower pressure is exerted in the discharge line to move the product through the hose. Unloading of the tank can actually be accomplished with either a tractor-mounted blower with power take-off or with a gasoline mounted engine of the trailer to power the blower.

Fruehauf Trailer Co., Detroit 32, Mich.

For more details circle 125 on Enclosed Return Postal Card.

Curb & Gutter Paver

A recently designed Speedmaster Curb and Gutter Paver that will now pave curb and gutter of either Portland cement concrete or asphalt, with equal facility has been produced by Dotmar Ind.

In laying asphaltic curb and gutter, "mass production" can be obtained with the new Dotmar, by using the two outer forms, the same as used in paving with cement concrete, because the asphalt can be dumped in a windrow between the forms, ahead of the

Dotmar Paver

paving machine. All the material does not need to pass through a hopper on the machine. Thus, asphalt trucks are not held up, but can dump their loads and leave. The new combination Dotmar machine can be used for curb and gutter, monolithic curb, gutter and sidewalk, sidewalk alone up to 6 ft. wide, highway widening strip and median strip. Reinforcing steel rods can be used with either paving material.

Dotmar Industries, Inc., 502 Hanselman Bldg., Kalamazoo, Mich.

For more details circle 126 on Enclosed Return Postal Card.

180 Deg. Arc Backhoe

A new backhoe for International 340 and 460 industrial tractors which digs to 12½ ft. depth within a 180 deg. arc, has been announced by International Harvester Co.

The International Wagner 1250 backhoe is capable of digging forward under sidewalks or obstacles or beneath the tractor with its improved bucket mounting. New bucket suspension allows the backhoe to dig square holes or other special sized or shaped encasements. Exclusive self-aligning trunnion bearings are used at all important pivot points. A double trunnion bearing is used within the frame itself. The heavy-box beam design of the backhoe is given additional support by a full-length heavy-duty subframe. Hydraulic power furnished by the tractor's internal hydraulic pump, speeds the operation of the backhoe, which is close-coupled to the tractor making maneuvering easier.

New IH Backhoe
(Insert: Trunnion Bearings)

International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

For more details circle 127 on Enclosed Return Postal Card.

Two-Way Radio

Featuring a fully transistorized power supply and rugged, compact design, Du Mont has announced a 15 watt version of its recently developed Transicom two-way radio for use in the 144-174 mc band.

The new under-the-dash mounted unit, designated model 326A, is handcrafted wiring throughout. The unit utilizes transistors, other semi-conductors and vacuum tubes. The unit is

DuMont's Two-Way

been designed without complicated circuitry and can afford ease of maintenance through accessibility of all component parts. The 3 by 5 in. speaker is built directly into the front panel as an integral part of the radio set with the audio chamber directing the sound to the driver's ear. Two basic controls are used: a power control switch; and a combination volume/squelch control.

Mobile Radio Sales Dept., A. B. DuMont Lab., Fairchild Camera & Instrument Corp., Clifton, N. J.

For more details circle 128 on Enclosed Return Postal Card.

Engine Driven Welders

Three new engine driven welders which provide rugged and dependable service while requiring only a minimum of maintenance have been announced by Air Reduction Sales Co.

A new 225 amp AC-DC engine driven welder—powered by a Kohler engine—can handle stick electrode welding, Heliwelding and Aircomatic welding. The power source supplies amperages from as low as 15 amps to 265 amps DC and 25 to 320 amps AC. Two new DC diesel welders are recommended for field welding where rough usage is encountered. One, the "Yellow Jacket" welder, has been designed in 300 and 400 ampere rated sizes and powered by a 4-cylinder, 4-cycle injection type diesel engine, for service on heavy duty construction jobs. The third welder—rated at 250 amp. and

Air Reduction Welder

utilizing a 4-cycle, 3 cylinder direct injection type diesel engine—is available both as a DC welder/AC power plant or solely as a DC welder. These models are recommended wherever rough usage is encountered in welding.

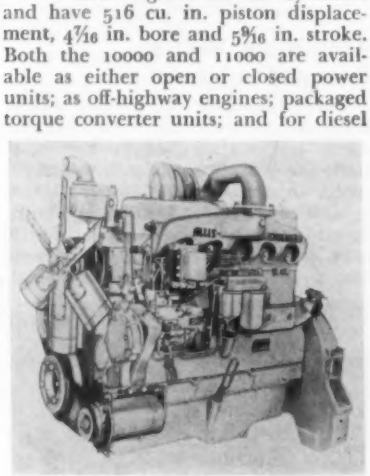
Air Reduction Co., Inc., 150 East 42nd Street, New York 17, N. Y.

For more details circle 129 on Enclosed Return Postal Card.

Diesel Engine Line

The addition of a 145 hp naturally aspirated Model 10000 engine, and the 210 hp turbocharged 11000 engine to its line of diesel engines was announced by Allis-Chalmers.

The new engines are six cylinders and have 516 cu. in. piston displacement, 4 7/16 in. bore and 5 9/16 in. stroke. Both the 10000 and 11000 are available as either open or closed power units; as off-highway engines; packaged torque converter units; and for diesel



Allis-Chalmers Diesel

electric sets. The 11000 diesel for light duty marine applications has a 200 shaft hp rating at 2200 rpm and the 10000 diesel for the same purpose is rated at 145 shaft hp, also at 2200 rpm. The electric set with the 10000 engine provides up to 66 kw and the set with the 11000 engine up to 110 kw.

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

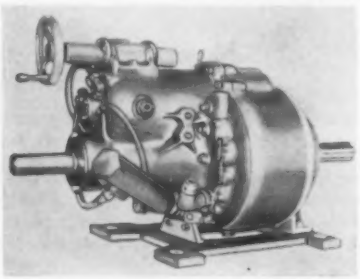
For more details circle 130 on Enclosed Return Postal Card.

Variable Speed Transmissions

A new 10 hp. variable speed hydraulic transmission that will permit mod-

ernization of existing machinery has been announced by Roberts Electric Co.

The new unit is reported to provide infinitely variable speeds from 0 to 1600 rpm for high-torque heavy-duty applications. Construction machinery, pumps, concrete machinery and hoists are a few of these applications. The machine will drive at 1800 rpm or less with any 2 to 10 hp. motor or 20 hp.



Roberts Variable Transmission

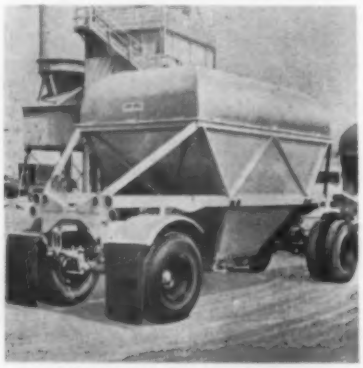
gas engine. Precise speed selection is obtained by rotation of hand wheels giving an infinite number of speeds through the entire range of the unit. The manufacturer states that the controls are easily altered for remote control. The output shaft is 1⅝ in. dia. and 4 in. long.

Roberts Electric Co., 849 W. Grand Ave., Chicago 22, Ill.

For more details circle 131 on Enclosed Return Postal Card.

Aluminum Bottom Dump Trailer

The production of two new Cook-Brogdex lightweight aluminum bottom dump trailer trains, engineered especially for over-the-road hauling was recently announced. The Model LWC-2 is built expressly for hauling dry, bulk, flowable materials such as sugar, fertilizers, grains, chemicals, etc. Each model has a 28 ton capacity. The model



Aluminum Bottom Dumps

LWC-2, is equipped with the patented double-acting butterfly gates. These trains are constructed of alloy aluminum and light, high-tensile steel truss.

Challenge-Cook Bros. Inc., Department 13, 3334 San Fernando Road, Los Angeles 65, Calif.

For more details circle 132 on Enclosed Return Postal Card.

Fiberglass Sign

Fiberglass Traffic Signs that will reportedly outlast other types of signs has been announced by Fiberglass Sign Co.

The signs are manufactured of fiberglass reinforced polyester plastic panels. The sign messages are applied with a special epoxy resin paint that won't

Fiberglass Signs

chip, peel, chalk or fade. The high strength fiberglass board and epoxy paints developed for these signs are inert to acid, industrial fumes and all climatic conditions states the manufacturer. These ready-made signs are also reflectorized.

Fiberglass Sign Co., Box 3042, Corpus Christi, Texas

For more details circle 133 on Enclosed Return Postal Card.

New Backfiller

A new machine designed for fast backfilling, has been introduced by the Vermeer Manufacturing Co. of Pella, Iowa.

The new backfiller, the "Pow-R-Ditch Filler", deposits dirt back in the ditch in one pass, resulting in considerable saving in time and labor. A rear mounted 36 hp Wisconsin engine powers the Ditch-Filler. Hydraulic power provides forward travel speed during backfilling. When in transport

Vermeer's Backfiller

the unit uses mechanical drive. Power steering is a standard feature. The front mounted 24 in. power driven auger, 7½ ft. long, deposits dirt back into the ditch and leaves adjacent area clear of all debris and dirt. The new machine has a 4-wheel drive unit jointed in the center for easy steering, better control and greater ground grip from all 4 wheels. The operator's platform is located above the auger, allowing clear unobstructed visibility both ahead and behind the unit.

Vermeer Mfg. Co., Pella, Iowa

For more details circle 134 on Enclosed Return Postal Card.

Rubber Blasting Mats

A new, heavy duty, rubber blasting mat for safe shooting in congested areas is now available from O. B. Wasbotten & Sons.

Called the "Bombproof Blasting Mat," it is made of sliced-up auto tire casings woven together with steel cables to form a thick, strong resilient covering. The new rubber mat is reported to resist damage indefinitely under normal blasting conditions. Should a heavier-than-normal blast occur, however, it is easily repaired. According to Wasbotten officials, the new mat gives more protection against flying rock than ordinary steel mats. This is because it has the natural resiliency of

Wasbotten Blasting Mats

rubber and also has great weight. A 10 ft. x 12 ft. rugger mat, for example, weighs about 2400 lbs. Wire or rope slings are used for handling. An advantage of the rubber mat is that it will not short-out electric blasting caps. Consequently, contractors working in built-up areas can use millisecond delay electric blasting caps to get greater production at minimum energy levels.

O. B. Wasbotten & Sons, 1609 Arrowhead Rd., Duluth 11, Minn.

For more details circle 135 on Enclosed Return Postal Card.

Concrete Joint Sealer

A pre-molded concrete joint sealer, Sealfastic, has been announced by National Expansion Joint Co.

Thoroughly waterproof, Sealfastic has complete expansion recovery up to one in., according to the company. The new material may be slipped into joints as thin as ⅛ in. sawn joints, straight or curved. There is no drip or spillage, so it may be placed exactly at any elevation in the joint. It is reported to last indefinitely, but; in case of damage it may be replaced very quickly with only hand tools. It will not ignite and is fuel resistant. Consisting of one in. bats of polyurethane foam, it is impregnated with a wide choice of types and colors of binders.

National Expansion Joint Co., 1601 Embarcadero, Oakland, Calif.

For more details circle 136 on Enclosed Return Postal Card.

55-Ton Crawler-Mounted Crane

A new high capacity crane has been announced by Construction Equipment Division of Baldwin-Lima-Hamilton Corp.

This new crane, designated the Type 65-SC, has a lifting capacity of 55 tons with a 40 ft. boom at 12 ft. radius. The boom can be extended to 180 ft. for such work as boosting concrete buckets on multi-story building construction. Precision air-operated main and auxiliary controls provide ease of operation and good handling ability.

Long, crawlers afford large ground bearing capacity for special crane service. Crawler side frames and counterweight can be removed easily to meet clearance requirements and load restrictions when trailing. A choice of gasoline, diesel or electric drives, with torque converters, provides flexibility for any application and ample power for heavy lifting. Construction features include heat-treated ground shafting, machine-cut gear teeth, and booms built of high-strength tubular welded alloy steel.

Baldwin 55 Ton Crane

The gantry is a high, folding type with telescoping legs. Power-raised or lowered by boom hoist cables, the gantry folds to cab height to permit the crane to pass under 12 ft. clearances.

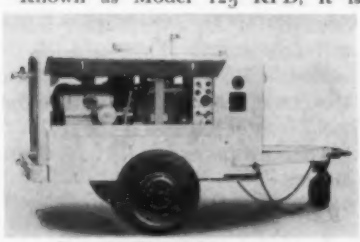
Baldwin-Lima-Hamilton Corp., Philadelphia 7, Pa.

For more details circle 137 on Enclosed Return Postal Card.

Diesel Rotary Compressor

A new 125 cfm. diesel-powered 2 wheel rotary compressor has been announced by the Davey Compressor Co.

Known as Model 125 RPD, it is powered by a Hercules DD-198 engine. Outstanding features include Davey patented Perma-Vane rotor blades, built in double tool boxes and adjustable cooling shutters. A centralized instrument panel with hour meter is standard equipment. The unit is 122 in. long, 65 in. wide and stands 63 in. high. Weight is 2790 lb.



Davey's Diesel Compressor

Davey Compressor Co., Kent, Ohio

For more details circle 138 on Enclosed Return Postal Card.

Compact Roller

A compact pneumatic-tired roller is being introduced by Rosco Mfg. Co.

Designated the Air-Pac, the roller has a rolling width of 36 in. and a turning radius of only 10 ft., giving the roller great maneuverability even in the most restricted work areas. Pneumatic-tired wheels are located 4 in front, all full-oscillating, and 5 at the rear. Tires are 4.00 x 12 sizes, 4 ply, wide thread, smooth face. The roller weighs 1970 lb. empty. Ballast capacity is 16 cu. ft. The total working weight of the machine is 2 tons. Working speeds in both forward and reverse are 0 to 3½ mph.

Rosco's Compact Roller

Rosco Mfg. Co., 3128 Snelling Ave., Minneapolis 6, Minn.

For more details circle 139 on Enclosed Return Postal Card.

Chain Saws

A new chain saw featuring power balanced design and a weight power ratio convenient to use has been announced by the Lancaster Pump and Mfg. Co. The new saw uses a 5.8 cu. in. displacement industrial chain saw engine and operates in any position via a fuel pump diaphragm carubretor.

Lancaster Chain Saw

Lancaster Pump & Mfg. Co., Inc., Manheim Pike, Lancaster, Pa.

For more details circle 140 on Enclosed Return Postal Card.

Continued on page 178

Thousands Save on Truck and Tractor Maintenance with Almasol Gear Lubricants

The same ALMASOL Wear-Arresting Agent which originally helped solve problems of high surface temperatures, extreme pressures, and acid corrosion on supersonic jets and space-conquering rockets is now providing ***new dimensions of protection*** for heavy equipment.

Transmissions and differentials on trucks, tractors and other heavy duty work equipment are critical areas. Here loads are heaviest... heat at maximum... failures costly ... downtime lengthy.

Mass-produced automotive gear oil cannot handle the extreme conditions of pay-loaded equipment.

ALMASOL 607-608 Gear Lubricants are advanced products which have demonstrated time after time their ability to reduce frictional heat from 50° to 80° F. in heavy "work horse" fleets. The Almasol supplemental lubrication creates a friction inhibiting surface on gears and bearings, and protects against acid pitting.

ALMASOL provides a margin of protection far beyond the realm of ordinary gear oil. The Almasol film "takes over" when overheating or overloading creates conditions which would cause oil alone to fail.

FREE LITERATURE

We would welcome the opportunity to send you informative brochures discussing how LE's exclusive patented ALMASOL Gear Lubricants can increase your operating efficiency and save you money on maintenance costs — just as it has for thousands of other heavy equipment owners.

WRITE, WIRE OR PHONE DEPT RS-1

LE LUBRICATION ENGINEERS INC.

Fort Worth 11, Texas

Custom Built Lubricants for Heavy Equipment

NAME_____

FIRM_____

ADDRESS_____

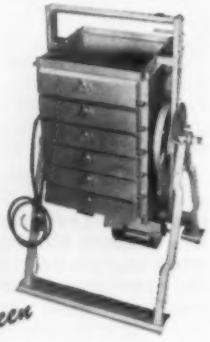
CITY_____

... for more details circle 326 on enclosed return postal card

GILSON TEST-SIZING EQUIPMENT

GILSON TESTING SCREEN

Handles up to 1 cu.ft. of concrete aggregates, coal, or minerals; 2 to 7 simultaneous separations in about 3 min.; 4" to 200-mesh.



GILSON *Porta-Screen*

For field inspection, ready-mix, blacktop, concrete products, minerals; portable, operates free-standing; samples up to 25 lbs.; 1½" to 200-mesh.

GILSON SAMPLE SPLITTER

Halves or quarters large samples in seconds; handles any material from sand to 4" aggregates; adjustable openings ½" to 6".

WRITE FOR GILSON CATALOG SHEETS ON THESE AND OTHER GILSON EQUIPMENT AND ACCESSORIES

GILSON SCREEN CO.
MALINTA, OHIO

. . . for more details circle 305 on enclosed return postal card

Sand-Sneezer closely follows squeegee team. Note light color produced by the Rain-On sand in contrast with the cement concrete approach pavement in background.

WATERPROOFING METHODS

Continued from page 60

of solvents that may later cause bleeding.

We have tried about every conceivable method of applying primer, settling finally on a hydraulic type paint spray system that does not have air applied at the nozzle. Working pressure is about 400 psi at the tip which has an orifice of 0.015 in. and a thin fan pattern with 70-degree spread. An aluminum hood on the pole gun helps control wind drift of spray onto passing vehicles.

It is advisable to defer sealing of the expansion points until after the pavement has been primed; the fresh primer will cause softening of most elastomeric sealants. A check for compatability of primer and joint sealer should be made. Areas of asphalt concrete patches in the deck should be carefully shielded while priming, as the xylene solvent in the primer will cause severe softening and bleeding of any asphalt.

Grit-Tar on Concrete

The slurry mixture consists of three parts emulsion and two parts of medium sand, by volume. Small amounts of water may be added as needed to maintain consistent workability under varying conditions. It can be mixed in an 8 cu. ft. mortar mixer.

We prefer spreading by hand squeegees, with overlapping transverse strokes along an area one lane wide. Overlapping-alternate strokes result in a "weaving" action which cannot be produced with any slurry drag boxes we have seen. With trained workers, consistent and uniform results can be achieved. Great emphasis is placed on spreading the slurry just "one sand grain thick". When dry, the tar film shrinks to about one-half a sand grain in thickness, considered ideal for sealing and anchoring the sand.

The quantity of slurry will vary somewhat depending upon concrete texture. In general, 0.30 gal. per sq. yd. of emulsion (0.50 gal. of slurry) will produce the desired thickness.

If any concrete approach pavement is to be paved over, those areas too should be treated, taking in gutters and lanes that do not carry traffic. On the active lanes, traffic will tend to improve the Grit-Tar's bond and integrity, as it is "alive" and malleable. This treatment is not believed skid resistant enough for an expressway, but it will do for several weeks until the asphaltic pavement can be laid. More sand is needed for a higher coefficient of friction if the seal is to serve more permanently as a riding surface.

"Rain-On" Explained

Late in 1960 techniques were

Sand-Sneezer being used to apply Rain-On sand directly from dump truck. (Photo October, 1960.)

Sand-Sneezer with suction pipe long enough to work in 55-gal. open-top sand drum.

developed for applying this extra sand. It must be added while the slurry is still very wet—uniformly, gently and left undisturbed in the slurry as it dries.

We call this added sand "Rain-On" sand which we apply with a "Sand-Sneezer." It should be explained that our nomenclature is not meant to be facetious. Names are coined for any new tool or process that will convey as vividly as possible to the workmen the function or intent. It helps get desired results. With the Sand-Sneezer, sand can be dropped "as gently as rain." The sneezer will pick up and deliver bulk sand out of a dump truck or barrels, just as it comes from the stockpiles. Moisture content has little effect on the blowing, even helps incorporation into the slurry.

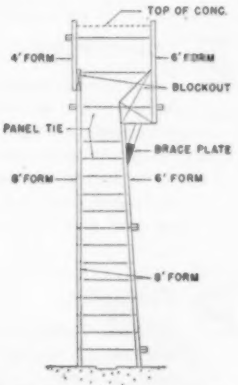
On concrete surfaces, we use the same gradation (medium) for Rain-On sand as in the slurry, and about the same quantity per sq. yd. To compensate for uneven spread, loss into depressions, etc., we try to apply "Rain-On" at 0.20 gal. per sq. yd., sufficient to insure that only

Battered Walls

Symons Forms on St. Louis Expressway

. . . Form Double Battered Walls 12" at Top, 3' at Base

On the downtown phase of the St. Louis Mark Twain Expressway, contractor R. B. Potashnick & J. S. Alberici Construction Company used 8,000 sq. ft. of Wood-Ply and 20,000 sq. ft. of Symons Steel-Ply Forms.



Job called for retaining walls, many of them double battered so that forms were angled to give 12" top thickness and up to 3' thickness at base. Heights varied from 4' to 34'. In addition, the forms were used to pour footings, abutments, piers and beams. Contractor obtained 30 re-uses.

Symons Forms may be rented with purchase option. Additional information on how to use Symons Forms for *battered walls* sent on request.

Symons

SYMONS CLAMP & MFG. CO.

4283 Diversey Ave., Dept. B-1, Chicago 39, Ill.

MORE **SAVINGS** FROM **SYMONS**

. . . for more details circle 339 on enclosed return postal card

FORNEY
CONCRETE TESTERS

are your best investment in low-cost concrete testing equipment.

HERE'S WHY!

EXPERIENCE

Forney's, Incorporated are pioneers in the design and manufacture of plant, job site and laboratory testing equipment for concrete and concrete products.

SPECIALISTS

Forney's, Incorporated is the only concrete testing equipment and apparatus manufacturer specializing in the construction industry.

COMPLETE LINE

Forney's, Incorporated manufacture testing equipment for all concrete products including blocks, pipe, drain and sewer tile, beams, cylinders and cubes. Special apparatus designed and built to order.

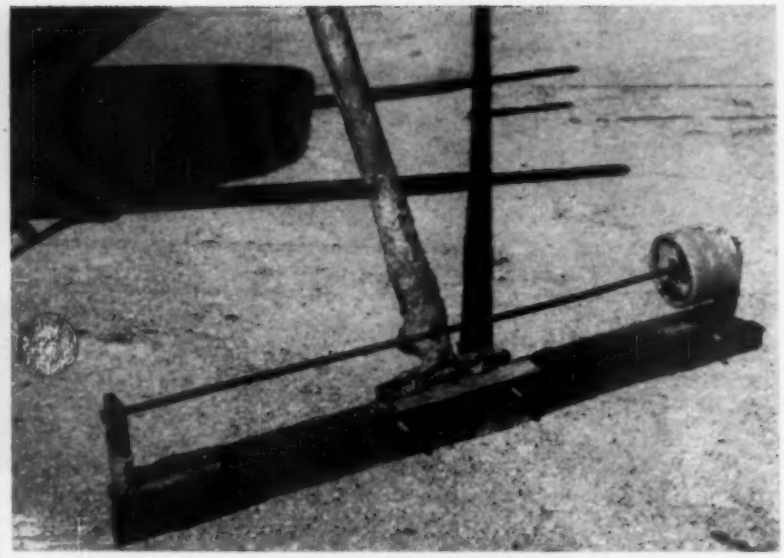
GUARANTEE

All Forney Testers are unconditionally guaranteed against defective material, workmanship and performance. Your complete satisfaction is positively assured.

Write, wire or phone for information, prices or specific recommendations on testers to meet any testing requirements.

KNOWN THE WORLD OVER

FORNEY'S, INC.
Tester Division
P. O. Box 310
New Castle, Pa., U. S. A.
Phone OLiver 2-6611
Cable : Forney's, New Castle



Squeegee showing sliding (cylindrical) lead weight mounted above blade.

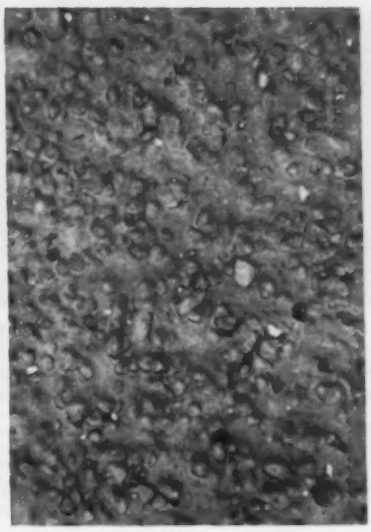
Two-man squeegee team. Note overlap of strokes and rolling wave action ahead of blade; sliding weight; and dihedral handle for lower hand which gives operator close control of pressure on the blade.

sand and no tar will be in contact with traffic.

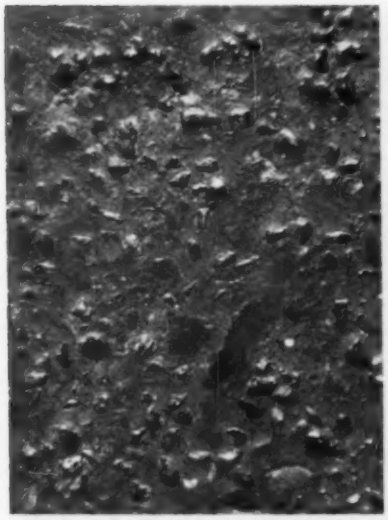
Warning! Grit-Tar is not the traditional "shot of road oil and chips" with a slight change in components. The clay filling in the dried film secures the sand by partial embedment rather than by simple adhesion. This results in greater resistance to throw-off of sand, particularly in its early life under traffic. The principle that a lot of small particles give greater skid resistance than a few large ones is carried to a practicable limit. The material is silica sand, generally accepted as superior to softer stone such as limestone which may polish soon on an expressway. It is believed that tar is superior to asphalts in resisting the action of oil and grease droppings on bituminous concrete pavements. The greatest distinction in application is that Grit-Tar should never be rolled, nor should any vehicle be allowed on it until the emulsion has "broken" out light gray all over.

. . . for more details circle 295 on enclosed return postal card

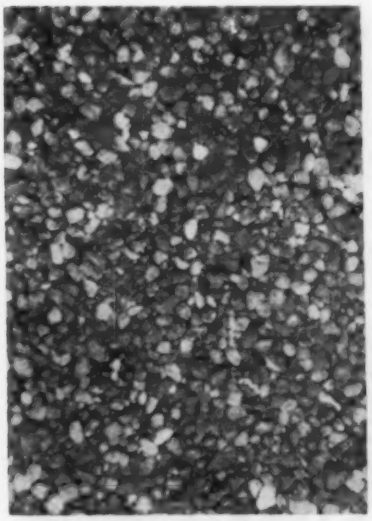
Dumping slurry into windrow.



Medium sand Grit-Tar slurry, as laid on asphalt concrete with no subsequent traffic (Area A in other scene).



Coarse sand Grit-Tar slurry on asphalt concrete, showing grains locked into depressions by traffic usage but not much available for traction (Area B).



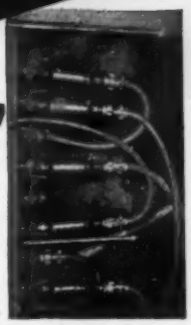
Full Grit-Tar treatment with medium Rain-On sand on main-line driving and passing lanes, after considerable exposure to traffic (Area C).

The Sand-Sneezer had to be developed to make the system possible because conventional methods of spreading would involve running vehicles on fresh slurry. Our first improvisation was built on an ordinary ejector designed for use with liquids (an available Penberthy Model 65A bronze unit). It scoured out in about 50 hours with the hard sand, but brazing on metal around the worn barrel helped get us through the 1960 season. It also became apparent that a scoured out, less efficient, venturi produced a more "gentle rain" of sand with a desirable short trajectory of some 20 ft. We therefore anticipate making our own Sneezers out of standard iron pipe fittings, with the vulnerable parts deemed expendable. Compressed air is used for the Sand-Sneezer with pressure regulated at about 50 psi.

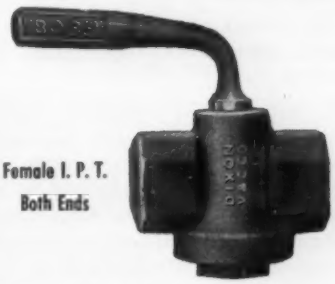
Grit-Tar on Asphalt

Grit-Tar with Rain-On sand is applied to asphalt concrete pave-

Avoid One Cause of Air Line Leaks and Pressure Loss



"BOSS"
Self-Honing
AIR VALVES



Female I. P. T. Both Ends

Built to withstand the hard knocks of mining and construction service, "BOSS" Valves are also ideal for general use on pipe lines, hose lines, compressor tanks, etc., and for the handling of water. They do not require packing.

Bronze plug firmly seated by spring tension against harder metal of valve body is automatically honed to perfect seat as handle is turned. A straight, full-flow opening extends through valve body and plug, providing greater capacity with no friction loss. Valve opens or closes by a quarter turn of the handle.

INTERNALLY ATTACHED HANDLE—In sizes ¾" to 1½" valve stem and handle are combined in a strong one-piece forged steel unit which is anchored to the bronze plug within the valve body. This patented feature eliminates stem and handle breakage. Sizes ¼", ⅜", ½" and 2" have externally riveted handles.

Male I. P. T. Both Ends

Stocked by Manufacturers and Distributors of Industrial Rubber Products

DIXON
Valve & Coupling Co.
GENERAL OFFICES & FACTORY—PHILADELPHIA 22, PA.
BRANCHES—CHICAGO · BIRMINGHAM · LOS ANGELES · HOUSTON
DIXON VALVE & COUPLING CO., LTD., TORONTO, Associate Companies

. . . for more details circle 292 on enclosed return postal card

Four textures showing from left to right: (A) Medium sand Grit-Tar slurry on unused gutter lane. (B) Coarse sand Grit-Tar on acceleration lane. (C) Full Grit-Tar with Rain-On sand treatment, on driving and passing lanes. (A, B and C applied to one-year-old asphalt concrete pavement.) (D) in left background, untreated concrete pavement.

ments in substantially the same manner as on concrete. There are however several important differences as follows:

No primer can be applied, as it would cause bleeding. None is needed.

Asphalt concrete pavement should be permitted to weather through one winter or until the asphalt at the surface has oxidized down to a rather "dead" condition. Otherwise the sand will sink in and the surface become fat under traffic.

The coarse sand is used in the slurry in the same proportion of three parts emulsion to two parts of sand. The coarse sand's larger grains are better adapted to fill in the relatively larger recesses in the asphalt concrete, to provide a more solid base for the Rain-On sand which is a medium graduation. Because more slurry sand is consumed in filling voids in the asphalt concrete than on p.c. concrete, there will be a greater deficit to be made up by the Rain-On course to get 100 percent coverage. About 0.30 gal. per sq. yd. of medium sand in the Rain-On course is needed to produce a dry-sand surface free of visible "fat".

We do not flush down the surface before applying the slurry as is commonly recommended. A somewhat "soupier" slurry combined with cross weaving squeegee stroke achieves complete wetting and penetration without holidays or air bells resulting.

Maintenance Methods Devised

Here, then, is a complete system of sealing and skid-proofing expressway bridge decks of any condition or type. The problem remains of protecting the investment and maintaining effectiveness over the years.

We anticipate using a mixture of sand and emulsion applied with the Sand-Sneezer when and as needed, to refurbish a Grit-Tar surface that may be wearing thin or needing new sharp sand for restoring the coefficient of friction.

The evolution of what we call the Grit-Tar System here has taken five years. This would not have been possible were it not for the vision and understanding on the part of Thruway Authority officials of the problem of maintaining expressway bridges. An awareness of the need for preventive maintenance led to the finding of means to first check, then bring the threatened deterioration under control. Under the direction of C.H. Lang, chief engineer, and M. G. Dapson, superintendent of maintenance, a bold program has been vigorously pushed to get the bridges covered. From the outset no compromise in quality and effectiveness of methods has been tolerated. As a result of this firm policy, the bridges are protected with coverings that are believed worthy of the heavy traffic.

Acme SCREENS

UNIFORM MESH HELPS YOU INCREASE PROFITS

The uniform mesh in Acme Screens assures you faster separation of sand, gravel and other abrasive materials *at less cost.* Pre-crimped to exact sizes for proper spacing — no irregular openings to slow the flow of materials. Made of quality steel and alloys, Acme Screens are abrasion-resistant — last longer. Made in Texas — which is important when you want *faster delivery.*

PHONE PE 3-8141

Acme IRON WORKS

CULEBRA AVE. AT EXPRESSWAY N. W.
P.O. BOX 2020 • SAN ANTONIO 6, TEXAS
MANUFACTURERS OF INGRAM ROLLERS

ROTARY SWEEPER BROOMS

WE MANUFACTURE

• Austin - Western
• Cub Low Boy
• Det-Harvester
• Fordson
• Ferguson
• Grace
• Gutteronips
• Hough
• Huber
• Jeep-Willy's
• Littlefords
• Little Giants $69.50 Up
• Moll (M.B.)
• Blumberg
• Ram
• Rosco
• Somerswell
• Tampo
• Wayne Model 480
• And Many Others

Special Sizes made to order

• COCOA ROLLER MATS •

Drag Broom Levelers
Street Push-Concrete Brooms

RE FILLING BUILDING PAIRS

KENNEDY'S

VAN BRUSH MFG. CO. INC

2728 McGee Trfwy. Kansas City, Mo.

"Equipment Superintendent for established highway and heavy construction contractor. Must have thorough knowledge and be capable to supervise the maintenance and repair of large heavy equipment spread. Excellent opportunity for right man."

THE W. L. HARPER COMPANY

P. O. Box #170
CINCINNATI (12) OHIO

FOR SALE:

10' x 40' shop made dining car, used two (2) years. Equipment: Air conditioner, 4 pan steam table, dishwasher, 20' deep freeze, 10' refrigerator, stainless steel sink, ice cube machine and all necessary silverware, dishes and utensils for serving approximately 35 men. Price $7,250.00.

Will trade unit for 50' 36" conveyor with vibrator.

G. H. Lindekugel & Sons, Inc.

Box 945 Mitchell, South Dakota
Telephone: WYman 6-7507

USED EQUIPMENT

MOTOR GRADERS

Adams 412H Motor Grader.
Adams 610 Motor Grader with plow and wing.
Adams 550 Motor Grader with plow and wing.
Austin-Western 99 Motor Grader.
Cat. No. 12 Motor Grader with plow and wing.
Galion 101 Motor Grader.
Galion 116 Motor Grader.

SCRAPERS AND DOZERS

L-W B Tournapull.
L-W D Tournapull.
LaPlant-Choate C-114 pull type scraper.
LeTourneau Super C Tournadozer.
2 Model 2C-500 Heiliners.
IHC TD-9 tractor.
IHC TD-14 tractor with angle-dozer.
Cat D4 Traxcavator.
Cat D6 dozer.

MISCELLANEOUS

Jaeger 125 air compressor.
Link-Belt LS-85 shovel attachment.
Link-Belt LS-68 trench hoe attachment.
Huber 8-12-ton roller.
Thrun bituminous surface mixer.
Transport Model GPX-24F trailer.
Ford T800 truck tractor.
Titan chain saw.

THE GEORGE T. RYAN CO.

171 27th Ave. S.E.
Minneapolis 14 - - - Minn.
FEderal 1-7981
Hibbing, Minn. 2716 First Ave.
AMherst 3-6895

FOR SALE

2—P&H DIESEL ELECTRIC GENERATING PLANTS 100 KW - 120/208 or 240 Volt - 3ph 60 cy. - 4 wire Engine: P&H 2 Cycle Diesel - Modern - Compact Aluminum design. Generator: EM - Latest Model, Glass insulated. Switch Gear: The most complete control board possible to build. Condition: These units as New and subject to any test or demonstration, delivered 1955-56. Price: $4500 - FOB Minneapolis, each.

1—D-30 Hi-boy 26' bed Freuhauf; Mod. 426; Serial No. 084975. Timken Single Axle - air brakes. 10.00 x 20 tires - 10 Hole Budd wheels. Sell price: $800.00.

1—Haiss - Under-Car Unloader. Mod. 501. Serial No. K10737. 600 x 16 tires. Wisc. 4 cyl. Air cooled w/clutch and Red box. NEVER BEEN USED. Sell price: $1,800.

1—D-68 Trailmobile - Tandem flatbed. 26' bed - Full lg. reinforced frame - oak floor. Air brakes, 1000x20 tires, good. Sell price: $3,100.00.

1—B-9 Cleaver-Brooks Steam Roller - Portable. Mod. L.F.M. 8-12; Serial No. P-8075 125# - 150# W.P. Single - Tandem axle, 8.25 x 20 tires. D-140 LeRoi. Accessories: Steam generator, Dual Safety Valves, Dual water level control. Sell price: $1,500.00.

1—B-11 Kewanee Roller - Portable. 85 H.P. - 150# Pres. Oil burner - Hauk Steam Atomizing Burner. Single Tandem - 10.00 x 20 tires. 5th wheel. S/N 10095-29. Sell price: $500.00.

1—Complete Aggregate Washing Plant. Located near Minneapolis.

JAY W. CRAIG COMPANY
1814 California St. N.E.
Minneapolis 18, Minn.
STerling 9-4387

FOR SALE

2—Hetherington & Berner 5,000# Asphalt Plants
1—Pioneer Continuous Mix Asphalt Plant
1—Parsons Trencher Model 290
1—Parsons Trencher Model 310
2—Buffalo-Springfield Tandem Asphalt Rollers 8 to 10 ton
1—Galion Tandem Asphalt Roller 8 to 10 ton
3—Barber-Greene Finishers 879A
1—Caterpillar D 8 Tractor with Wood Roadminer Model 84
1—Barber-Greene Bucket Loader Model 545A
1—Apsco Widener Model 95
2—International TD 18 Angledozers
1—International TD 14 Bulldozer
2—Bucyrus-Erie Cranes Model 22B
1—BMCO SP Roller
2—International 10 9 Wheel Tractors
7—1958 Ford F600 Dumps
Several 1950 and 51 Pickups
Other construction equipment too numerous to mention.

For further information, please contact:
F. D. Cline Paving Company
Attn.: E. E. Hester
Phone HUdson 4-6115 PO Box 3376
FAYETTEVILLE, N. C.

FOR SALE - Bargains

PIONEER ROCK & GRAVEL PLANT

150 PRL Primary unit for Rock, consisting of main truck, equalizer, eight 10:00 x 20 pneumatic tires, semi-trailer hitch, bolster front axle, wheels and tires, 2036 Jaw Crusher with hopper, 30" x 22'6" delivery carrier, tumbler shaft and gear drive, 36" x 30' 3-chain portable type Apron Feeder mounted on four 10:00 x 20 pneumatic tires, 7' side board extension and sloping side boards, hydraulic brakes on four wheels with air controls, and powered with D8800 Caterpillar Power Unit with enclosed clutch and stub shaft. 39V Pioneer Gravel Plant consisting of main truck with 3 axles, equalizer, twelve 10:00 x 20 pneumatic tires, 1036 Jaw Crusher, 3018 Roll Crusher, 4' x 10' - 3½-deck Vibrator Screen, 24" x 23'6" Return Conveyor Under Crusher, 24" x 36' Return Conveyor to Screen 24" x 40' Swivel Drive Feeder Conveyor. 24G Pioneer Mechanical Feeder, 7' Shovel Hopper and Trap Gate, 24" x 50' Delivery Conveyor, Chip Spout, 16" x 20' Sand Delivery Conveyor. Two Hydraulic Cradle Trucks with 7:50 x 20 tires, one set of Hydraulic Brakes with manual controls on four rear wheels powered with D1300 Caterpillar Engine. Very good condition, must see to appreciate. Located Oklahoma. Complete Overhauled.

Lorain Model L50 Combination Clamshell/Shovel, 50' Clamshell Boom with tagline, 1 yard capacity, powered with D318 Caterpillar Engine. Condition very good, located Oklahoma City. Call or wire for price.

ALL ABOVE EQUIPMENT PRICED F.O.B. LOCATION
Subject To Prior Sale Or Other Disposition

CALL, WRITE OR WIRE

Telephone — CEntral 2-8831

WYLIE-STEWART MACHINERY CO., INC.

1400 Exchange Ave. — Oklahoma City, Oklahoma

CALL UPON *MUTUAL* FOR THE NATION'S LARGEST

PARTS STOCK

Headquarters All Heavy-duty Equipment, Supplies & Parts

• DUMP TRUCKS • LOADERS • CRANES • ENGINES

Lowest Prices - Complete Satisfaction Guaranteed

NEW and Guaranteed REBUILT ENGINES

Completely Dynamometer "Run-In" and Tested in our own modern extensive rebuilding shops.

- HERCULES
- CUMMINS
- CONTINENTAL
- WAUKESHA
- GMC DIESEL

2000 S. WABASH AVENUE
CHICAGO 16, ILLINOIS

25TH YEAR OF QUALITY SERVICE TO THE HEAVY EQUIPMENT INDUSTRY!

MUTUAL TRUCK PARTS Co., Inc.

Telephone: CAlumet 5-3500

FOR SALE OR RENT

Good Used Contractors Machinery

1—Flex Plane 20'-25' Finisher.
1—Elgin 3 c.y. Street Sweeper.
1—Lorain TL-20 Crawler Dragline.
1—Lorain Model 41 ¾ yd. Dragline.
1—LeTourneau-Tourna Crane.
2—Seaman-Andwall self-propelled Pulvimixers.
1—Cat Series 8T No. 12 Motorgrader.
1—Austin-Western 99-H Motorgrader.
1—International I-9 Cherry Picker.
1—International I-9 rubber-tired tractor.
1—Murphy 75KW Generator.
1—LeTourneau Model M 6-yd. Scraper.
1—LeTourneau Model F 12-yd. Scraper.
1—LeTourneau Model H Ripper.
1—Hyster Grid Roller.
1—Bros self-propelled 9-wheel pneumatic roller.
1—Bros 60" Sheepsfoot Roller.
1—Austin-Western 10-12 T. 3-wheel roller.
1—Huber 10-12 Ton 3-wheel roller.
1—Galion 8-10 ton 3-wheel roller.
1—Galion 10-12 Ton Diesel Tandem Roller.
1—Huber 8-10 Ton Tandem Roller.
1—Galion Model P 3-5 Ton Asphalt Roller.
1—International ID9 Tractor
1—Ford rubber mounted Ditcher.
1—CMC-4" Diaphragm Pump.
1—Jaeger 3" Centrifugal Pump.
4—Chrysler 6 cyl. Industrial Engines.

MILLER C. BEASLEY MACHINERY CO.

2237 W. Northwest Hwy.
¾ Mi. W. of Circle on Grapevine Hwy.
P. O. Box 6995
Phone: FL 7-8325 Night: RI 2-6101
Dallas, Texas

PAVING EQUIPMENT

KOEHRING 34E PAVER
31,000 Batches, Used 3 Months

JOHNSON BULK CEMENT PLANT
BC-1 Single Silo S/N 60509
with Unloading Equipment

JOHNSON CHARGER TY 320
S/N 60332-1 (Nearly New)

TOURNAROCKER E-18
S/N TR 2806

REX SPREADER
Near New - Used 3 weeks
20' - 25' S/N DA 135

KOEHRING 405 DRAGLINE CLAMSHELL
Used one Year

— Immediate Delivery on any or all —

ARMSTRONG CO.,
P.O. Box 528
AMES, IOWA

PRICED TO SELL

Torque Converters. Twin Disc. Model CRR-10033-1S, New.
Storage Tank, 12,000 Gallon Capacity, Former Use Butane Gas.
Shells, Cylindrical 40 ft. x 10 ft., 3/16 plate, welded, ideal for Dryer Shell, Tank or Storage Silo.
Federal 6x6, 10 wheel, 4 ton Truck, new tires.
Hyster Model YT 40, Pneumatic Tires, 4000 lb. capacity Fork Lift Truck.
Clark Model Carloader, 4000 lb. capacity, solid tires, Fork Lift Truck.
Johnson Model P-500B Centrifugal Pump, 500 GPM, 100 PSI, 16 ft. lift, new, ideal for salvage, jetting or fire.
Stainless Pressure Tanks, AF Type JI, 400 lb. 50 gal. Underwater Pneumatic Lifting Bags. 12 ton capacity. Oil control valves, Detroit Lubricator Model CRC, new.
Trailers, Wagon Type, 4 wheel, tire size 900x9, 6 ply.

WRITE - WIRE - PHONE

GULF MACHINERY COMPANY
P. O. Box 6013 - Phone HE 8-5115
MOBILE, ALABAMA

1-Ton Ball Bearing Heavy Duty Trolley
Fits 4 to 10" I. Beams
$14.95 Tested
2-To-1 Safety Factor
SURPLUS LIQUIDATING CO.
2939 Olive St.
St. Louis 3, Missouri

BARGAINS

NELSON LOADER

1—Model 200D, serial #8596, with GM Diesel Model 371 engine, Allison torquematic, 1¾ yd. and 3 yd. buckets. Demonstrator.

TANDEM ROLLER

1—New 3 to 5 ton Ferguson portable, Serial #493, with towing attachment including rubber tired wheels with automatic hydraulic jack for raising.

CRAWLER TRACTOR

1—Used Terratrac Model 600 diesel, Serial #338, with Terraloader and accessories.

Ensminger & Co., Inc.
57 Wood Street.
Wilkes-Barre, Pa.
Phone: VAlley 4-3581

FOR SALE

TRUCK CRANE
New 25 ton Insley 90' Boom, 30' Sectional Jib, all extras including Folding & Floating High Gantry, Power Load Lowering, Screw Jacks & Floats, at dealers cost F.O.B. Philadelphia. Good rental and recapture deals accepted.

HOE & BOOM COMBINATION
Used 108 ⅜ yard Bucyrus. Crawler mtd., gas eng. powered, $4,200.

BACKHOES
Used but completely rebuilt K-12 Insley. New pads, rollers, drive sprockets and tumblers. $9,000.
Two year old K-12 Insley, G.M. Diesel powered, reconditioned and raring to go. $11,000.
(2) used TL-25 Lorain. Reconditioned, take your pick, $5,000.

LINK-BELT
K-360 with unused shovel front and 60' boom, used for hookwork and pile driving. Cat Diesel Engine, Ind. Boom Hoist combination, ready to work .....Price $15,000.00

ALEXSON EQUIPT. CORP.
1331X W. Cumberland St., Philadelphia, Pa.
BAldwin 5-5350
and 2935V Washington Blvd.,
Baltimore, Md. — Circle 2-9200

IMMEDIATELY AVAILABLE

2—Mod. 150B (6 cu. yd.) Comb. Shovel-Dragline, Electric, Air Conditioned. Used less than 7000 hours	$210,000.00 ea.
8—Mod. LRVX Mack Tractors w/30 cu. yd. Mod. 137W Euclid Bottom Dump Trailers. New 1958	36,500.00 ea.
10—Mod. PH95A International Payhaulers w/30 cu. yd. Mod. PW20 Athey Bottom Dump Trailers. Tractors have new 42SH P.G.M. Engines	30,500.00 ea.
10—Mod. DW20 Cat Tractors w/30 cu. yd. Mod. PW20 Athey Bottom Dump Trailers, 67C Series	27,000.00 ea.
12—30 cu. yd. Mod. MX30 Southwest Bottom Dump Trailers	5,000.00 ea.
10—Mod. DW20 Cat Tractors w/456P Cat ModifiedScrapers, 67C Series	27,000.00 ea.
10—D8 Cat Tractors w/PCU's and Dozers, 14A Series	18,500.00 ea.
5—D9 Cat Tractors w/PCU's and Dozers, 18A Series	26,500.00 ea.
6—Mod. 12 Cat Motor Patrols, 8T and 80C Series	8,500.00 to 10,500.00 ea.
9—15 cu. yd. Mod. 63TD Euclid End Dumps	24,000.00 ea.
4—60" x 20' Link Belt HD Manganese Apron Feeders	12,500.00 ea.
2—30" x 60" Gruendler Single Roll Impact Crushers	9,500.00 ea.
2—6' x 12' Tyler Mod. F800 Single Deck Screens	6,000.00 ea.

CALL, WIRE, or WRITE for Complete Bulletin!

TRINITY DAM CONTRACTORS

10 West Orange Avenue — South San Francisco, Calif.

Phone: PLaza 6-0300, Ext. 279

FOR SALE

CATERPILLAR 12 Grader, 8T. W/cab, large tires, Cat power steering	$5,750.00
CATERPILLAR 70 Scraper, large tires	5,750.00
LaPlant-Choate C106 Scraper	1,750.00
LeTourneau LS Scraper, 8-11 yards	2,750.00
Buffalo-Springfield Tandem Roller	3,650.00
Barber-Greene 705B Ditcher	1,750.00
Parsons 88 Ditcher, rubber tired	1,750.00
Fruehauf 30 Ton Tandem Low-boy	2,750.00
American Oil Field Float, 28'	900.00
Hyster D6N & D7N Towing Winches	
Lorain 41 Shovel Front, new, complete	1,250.00
2—GMC Tandem Dumps, 620 models, auxiliary transmissions. Each	2,200.00
EIDEL 60 Ton Low-boy, with tandem front dolly, like new condition	4,750.00
CATERPILLAR D13000 Power Unit, w/-radiator, clutch, steel skids	1,875.00
CATERPILLAR D337 Power Unit w/-radiator, gas starting, and clutch	1,500.00
MURPHY ME650 Power Unit, 200 H.P. w/radiator, clutch, steel skids	1,500.00
GM 6-71 Diesel Power Unit, with radiator, base and clutch	1,500.00
GM 6-110 Diesel Engine, with radiator, fan to flywheel	1,500.00
3—New Bucyrus-Erie 22B Booms	1,000.00
1—New Tractor Crane w/18.00x25's	1,250.00
Grace Rubber Tired Roller, 10 wheel	950.00

AL. FISHEL CO.

1318 No. Vandeventer — JEfferson 5-4482

ST. LOUIS 13, MISSOURI

879A - 879B SCREED PLATES & TAMPER BARS

BIG SAVINGS

Our plates are ½" thick made of high abrasion resistant Manganese Carbon Steel, machined flat and square. Bars are carburized and hardened to 58-60 Rockwell by a special process. Double wear for both. Check your Distributor Price. GUARANTEED satisfaction.

879A	879B	879A-879B Plates
4—30" Bars—$147.25	8—15" Bars—$156.25	2—5' Plates—$410.10
8—15" Bars— 160.55	2—12" Bars— 35.15	2—1' Plates— 103.66
2—12" Bars— 36.10		

CHASE ENGINEERING CO.

1751 N. 56th St. — Milwaukee 8, Wis. — SPring 1-3808

FOR SALE

2—A.C. TS200 Scrapers.
2—A.C. TS260 Scrapers..
3—Cat DW21 Scrapers (1958 Models).
2—Cat #12 Motor Graders.
1—Cat D-9 w/Push Block (1958 Mod.).
1—30 KW Power Plant.
1—60 KW Power Plant.
5—Vibro Plus Compactors.

CONTACT:

GEORGE H. HOCKING CONSTRUCTION CO.

South Range, Mich. - Phone 3395

FOR SALE

KOEHRING 1—½ Yard Clamshell and Dragline Crawler Crane, 55' Boom (Standard length Crawlers Serial #C5093, Caterpillar D13000 Diesel Serial #4S2555 Bought in 1-18-46 and is located at Greeley, Iowa.

KOEHRING L—½ Yard Clamshell and Dragline Crawler Crane, 55' Boom, Long Crawlers Serial #C7162 Caterpillar D13000A Diesel Serial #4S7653 Bought in 8-3-51 and is located at Fort Dodge, Iowa. These two machines are extra clean.

Write or Wire

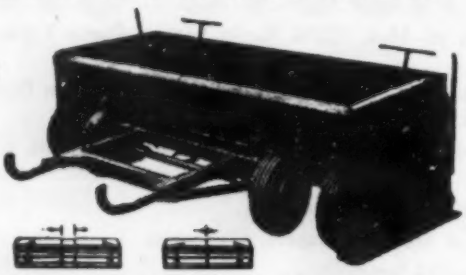
Fred Carlson Company, Inc., Decorah, Iowa

ROAD MATERIAL SPREADERS
WARREN SPREADER-PAVER

TELESCOPES 8' TO 12' IN WIDTH, 0-6" IN DEPTH

ALL PURPOSE

DESIGNED TO DO A BETTER JOB IN LESS TIME



Unique features enable units to be hitched to any dump truck with no hitches on truck required. Transported on the tail gate chains. The Warren Spreader-Paver is truly an all-purpose machine for hot mix and road base materials. It does an excellent job from road laying to small driveways. It is a real profit maker for both the small and large contractor.

Dealers — Representatives inquire

WARREN MANUFACTURING CO.

P. O. BOX 413 — LEFFEL LANE & PENN. R.R. — SPRINGFIELD, OHIO

NEW 5-Gal. G.I. GAS CANS

$3.00 Each Lots of 100
$3.50 Each in Lots of 12

10 lbs. each, Olive drab. Size: 14" long, 6½" wide. Condition: Excellent. Regulation cans formerly used by U.S. Army for Aviation gas. All orders shipped via freight collect. Please include Certified Check or Money Order when ordering.

Price Net F.O.B. Elizabeth, New Jersey

RING BROS., INC.

U. S. Highway No. 1 — Elizabeth, New Jersey
Bigelow 3-1202 — ELizabeth 4-3600

2 - LATE MODEL 28S WORTHINGTON BLUE BRUTE

1 YARD MIXERS

Powered Operated Skip, Batchmeter, Hydraulic Controlled Discharge, Chute And Water Metering Tank.

EXCELLENT CONDITION - READY TO GO!

SALE PRICE (No Power)..... $3500.00
SALE PRICE (Elec. Or Gas)..... $4750.00

EQUIPMENT CORPORATION OF AMERICA

Box 608-S, Clifton Heights, Pennsylvania
Box 43-S, Coraopolis, Pennsylvania (Sub. of Pittsburgh)

BRAND NEW WIRE ROPE

SIZE	NO. PCS.	LENGTH	STRAND	CENTER	PRICE PER FT.
½"	75	68'6"	18x7	wire	10c
½"	135	17'10"	6x25	wire	10c
½"	180	17'3"	6x25	wire	10c
5/8"	120	86'	18x7	wire	13c
5/8"	65	165'	6x25	fibre	13c

ILLINOIS MACHINERY COMPANY

MT. HAWLEY AIRPORT — TEL. 686-4433 — PEORIA, ILL.

FOR SALE

GENERATORS

OVER 200 COMPLETE PLANTS IN STOCK

1000 Watts to 750 KW

Portable — Stationery
Skid — Trailer Mounted

With and Without Power—Any Voltage
For Sale—Rental
Lease Purchase on Warranty Basis

Dealer Inquiries Invited

U. S. PIPE & MACHINERY COMPANY

2330 Auburn Blvd. (P.O. Box 3099)
North Sacramento, Calif.
Phone IVanhoe 9-7603

FOR SALE

AC-HD-11 dozer, 1957, 2600 hours, $11000.00. IHC-TD-18 dozer, 1958, 1100 hours, $9875.00. Oliver OC-126 loader, 1957, 1200 hours, $6500.00. Schield Bantams, Michigan truck cranes, $3000.00 up.

General Equipment Co.

511 E. Colfax
South Bend, Indiana

Blaw-Knox Concrete Finishing Machine Model XB, S/N 2062, 20-foot Screed with Extensions to 26 foot. Quick Crown Change.
Euclid Model S-7 Motor Scrapers with Torque Converters.
Jaeger 20-25 Foot Concrete Finishing Machine S/N 41-347.
Gardner-Denver 210 CFM Compressor mounted on four (4) Pneumatic Tires. Powered with CAT D-13000 Engine.
Gardner-Denver D-89 Wagon Drill with D-89 Drill.
Parsons Model 310 Ditcher, S/N 2201 - Powered with Cat D-8800 Engine.
Barber-Greene C-44 Ditcher, 24 inch x 8 ft.
Gardner-Denver Air Trac Model ATD 3700 with DH 123 drill, hydraulic positioners and swing boom.

Fehrs Tractor & Equip. Co.

1809-11 Cuming St. - Omaha 2, Nebraska
Phone 341-3127

SHOVEL FRONT COMPLETE
UNUSED! Gov't Surplus

For Model 802 Lima 2 Cu. Yd. Special .. **$2950.00**
50' Boom for 802 Lima 2 Cu. Yd. Special .. **$1250.00**

These attachments adaptable to other machines.

Prices F.O.B. Atlanta

FULTON EQUIPMENT CO., INC.

2235 Stewart Avenue S.W.
ATLANTA 15, GEORGIA
PO 7-8606

PAVING EQUIPMENT

You will find listed below the equipment contained in a complete paving spread. These machines are all in excellent condition and ready to go to work. We are disposing of this equipment due to the press of business in related fields of construction. All of this equipment meets state highway specifications.

1—C9 cu. yd. 2-compartment and sand bin, cantilever platform, columns 16'7", truck clearance 8'6". Wt. 15,910#.
1—3 'E. automatic type "J" dual stone and sand batcher with over-under weight lights. Wt. 4,500#.
1—37 yd. 11' dia. cement bin, cantilever, detachable columns 14'2", truck clearance 8'6". Wt. 9,174#.
1—Bin signal with adjustable support. Wt. 36#.
2—34 E. automatic interlocked cement batchers with two 8x15 electric air operated filling valves, two 8x15 automatic vane feeders, two 2 H.P. single speed Gearhead Unibrake motors (110 Volt) electrical controls. Wt. 5,500#.
2—Electric vibrators 110 Volt. Wt. 34#.
1—#44 cement elevator by 37' c/c 10" undertrack screw by 20'9" c/c. 10 H.P. drive and guard, parting detail (last 10' of screw removable.) Wt. 11,496#.
2/3 Set quick air connections for 2 bins and electrical connections and wiring for two bins.

THE ABOVE LISTED EQUIPMENT COMBINES TO MAKE ONE COMPLETE BUTLER BATCH PLANT FOR PAVING OUTFIT.

1—Quincy Electric Air Compressor.
1—Schramm Electric Air Compressor.
1—Rex 34E Double Drum Paver with Diesel motor, ad-air attachment, automatic controls, S/N GD305.
1—Heltzel Finishing Machine S/N 56x128 18' to 28'.
1—Jackson Vibrator and Paving Tube S/N 83200 Model PT-202A.
1—Heltzel Mechanical Belting Machine S/N 56x137 18' to 28'.
1—Heltzel Bridge 18' to 28'.
2—Cleveland Form Tampers S/N 306x56
S/N 320x56LB
1—Joint Applicator S/N 459 Model RJ-P.
1—Tar Kettle S/N 45-S366 Model AS-120.
6000' 10x10 paving forms.
1—Cement Car Vibrator.
2—Heltzel subgraders (tail blades) Adj. from 20 to 28 ft.
1—Cleveland subgrade scraper S/N 52x65.
1—Cleveland Form Grader S/N 236x56.
1—Tar kettle S/N 45-3366. Model AS-120.

ALL OF THE ABOVE EQUIPMENT WAS PURCHASED NEW IN 1956 AND HAS HAD VERY LITTLE USE. DURING 1958 IT POURED APPROXIMATELY 18,000 FEET OF FULL WIDTH SLAB AND WAS NOT USED DURING 1959.

1—Koehring Longitudinal Finisher, 20 to 24 foot widths with transportation wheels having four 6:00 x 16 Pneumatic tires and towing bar. Rubber wheels for one side.
1—Jaeger Concrete Spreader finisher. Model CSS20-25. S/N 57876, with Quick Crown Change Screed with one complete set of extensions, set for 24' width, 25/32" crown incl. 4 part #30088-2 single flanged and 2 part x3009-2 cone tread traction wheels installed with little lugs. Rubber wheels one side.

THE ABOVE EQUIPMENT HAS POURED APPROXIMATELY 18,000 FEET OF FULL WIDTH SLAB SINCE PURCHASED NEW IN 1958.

1—CMC 6 cu. yd. Transcrete Mixer S/N 106832.
1—Blaw Knox 3 cu. yd. mixer S/N 48-H3-287.
1—Butler Batch Plant.
Complete Stop Plant with one cement Elevator—Ideal for Ready Mix Plant—Fully automatic to meet highway specifications.
1—Track Plant for unloading bulk cement into trucks. Complete with cement screw.
1—Universal 10x24 & AW crusher. Roller Bearings S/N 119x50.
1—Adams 610 Motor Grader S/N 2523.
1—Caterpillar #12 Motor Grader S/N 8T2156.

THIS EQUIPMENT IS IN EXCELLENT CONDITION.

LARSON CONSTRUCTION COMPANY

P. O. Box 368
Cedar Falls, Iowa

1—USED 1959 REX 125 Porto Plant, Semi-Automatic, 485 Bbl. Cement Bin, 125 Ton Agg. Like New—Only 35,000 Yards.

5—USED 1959 REX 6 Cu. Yd. Moto Mixers, Separate Engine Drive, 75 Gal. Water Tanks, Mounted on Four (4) FWD Tandem Trucks and Int. R-190 Tandem. Only 2500 Miles on Trucks.

2—Fruehauf Bulk Cement Trailers 100-110 Bbl. Capacity.

1—USED REX Cement Car Unloader, 600 Bbl. per hour.

This Equipment was used on only one (1) Job and is in excellent condition.

WESTERN CONTRACTORS SUPPLY CO.
4817 LAKE STREET
MELROSE PARK, ILLINOIS

Columbus 1-8875
Fillmore 5-0690

BILL BARRETT
Nite Ph. FLanders 8-5179
Palatine, Ill.

FOR SALE

1—Model 879A Barber-Greene asphalt finisher, s/n: 52-258, on 10" crawlers, with LeRoi engine, 10 ft. width; with 2 ft. extensions, with bevel end plates, excellent condition, Price $8,000.00
1—Model 879 Barber-Greene asphalt finisher, s/n: 879-6-27, with 10" crawler tracks, no extensions, with 4 cylinder LeRoi Engine, in good condition, Price $5,500.00
1—Model 879A Barber-Greene asphalt finisher, s/n: 879A-52-171 on crawlers, with two 1 ft. extensions, with LeRoi 30 h.p. radiator cooled gas engine. In good operating condition. Selling price $6,500.00

All of the above prices are f.o.b. St. Louis, Missouri, and subject to prior sale, and are as is, where is.

For further information write, telephone, or wire:

ALLIED CONSTRUCTION EQUIPMENT COMPANY
4015 Forest Park Avenue, St. Louis 8, Missouri
Telephone Number: FRranklin 1-1818 or 1-7132

---

21 FT. SIDE BOOM

90% NEW
UNDERCARRIAGE

ALLIS-CHALMERS HD-19

S/N 1963 C.B. with 21' boom, Berg Pipelayer Model B6, complete with all riggings, cables and hooks, undercarriage 90% new, excellent condition. Write, Wire or Call:

Thompson Tractor
P. O. Box 2642 — FAirfax 4-1631
Birmingham, Alabama

Price F.O.B. Birmingham **$10,000**

WANTED

WE ARE NOW PURCHASING FOR EXPORT:

Caterpillar Graders Model 12—8T Series, D-8, D-7, D-6 Caterpillar pipelayers, D-7—3T Series and 17A series w/angledozers and P.C.U. or Hyster Winches; also 14A and 15A D-8's, Caterpillar 955 and 977 Loaders. Austin Western Hydraulic Cranes—truck mount and self propelled. Caterpillar D-17000 power units, Shovels—1½ yd. to 4 yd. cap—diesel powered, Truck Cranes—20 ton to 35 ton capacity, Crushing plants—complete.

Please advise Make, Model, Serial No., Location and Condition, pictures if possible; also lowest dealer's price.

GOLDEN GATE EQUIPMENT

1336 N. Carolan Ave. Burlingame, Calif.

Phone Diamond 2-7446

Evenings — Diamond 4-8510 — 3-8788

FOR SALE

MACK DUMP TRUCKS

10—1957 Model B-42 Tandems, 20 speed transmissions, 10 x 22 nylon lug tires, heavy duty hoists, construction type bodies, excellent condition, priced reasonably.

ALSO

1—AC Model D Road Grader, Gas engine, enclosed cab, new in 1959, little use.

MAIETTA TRUCKING CONTRACTORS

Route #3 Greencastle, Pa.

Phone: Greencastle 603

FOR SALE

ATOMIC VACUUM & PRESSURE

SEPTIC TANK CLEANING UNITS

These units engineered and guaranteed to be the best. Units can be used for cleaning septic tanks, blasting out fields, fighting fires, oil trucks, spraying yards, hauling water, etc.

For additional information write or call

GENE BOYD

CANTON, OHIO

GL. 2-3383 4211 - 47 N. W.

DRAGLINE MATS

Any Length, Width or Built to Specifications

We build them a little better for a little less.

STRICTLY HARDWOOD.

Also LUMBER and PILING

Kent Piling Co., Inc.

CHARLES KENT, PRESIDENT

Phone Days: Amite 2641 - 2644 - Night 8454

FLUKER, LOUISIANA

FOR SALE

AT BARGAIN PRICES—
TANK CAR TANKS

8000 Gal. Capacity

Ideal for storing fuel, asphalt & many other uses.

Excellent Condition.

Phone - Wire - Write

HYMAN-MICHAELS COMPANY

108 N. State St. Chicago 2, Ill.

'Phone: DEarborn 2-5422

CYLINDER HEADS
Save 50 to 80%

GAS and Diesel . . . Have your Cylinder heads rebuilt. Preheated and gas welded, machine complete, ready to install. Factory guarantee. Exchange service on popular models.

Chapin Cylinder Head Co.

Since 1938 - PHONE NO. 472-6121

CHAPIN (Morgan County), ILLINOIS

TRUCKS WANTED

Highest dollar value paid for new and used trucks and all kinds of used equipment. All types of truck equipment bought and sold, including war surplus. Write, phone or wire:

BILL FISHEL

Vandeventer Auto Sales

717 So. Vandeventer St. Louis 10, Mo.

Ph. FRanklin 1-1750

½" Steel Cable 50M. Ft., 7 x .175, Beth. Steel, New, Double Galv., Extra High Tensile 30,000# Reels 2 to 5M—$60M.

FINKS

322-4719

Williamsport, Pa.

WANTED

Bulldozer D6 or D7 or equivalent, with swamp tracks for use on Peat Bog.

SAM BEEMSTERBOER

11732 S. Yale Avenue

Chicago 28, Ill.

Phone - Pullman 5-6000

STEEL SHEET PILING

LARSSEN and ROMBAS Sections

STOCKS AVAILABLE IN:

- Linden, New Jersey
- Ft. Lauderdale, Florida
- Houston, Texas

WESTERN SERVICES CORPORATION

601 E. Linden Ave., Linden, N. J.

MArket 4-4000 HUnter 6-4000

In Florida Call: Port Everglade Steel Co. Ft. Lauderdale—JA. 4-6548

In Houston Call: G. Oliver—GA. 4-7234

RANSOME 34-E PAVER

Single drum, with water tank, powered with Cummins HBID diesel, used on one job since completely rebuilt. Make best cash offer or will trade for your surplus equipment.

OIL PRODUCTION & EQUIPMENT COMPANY

2711 South Main St., Suite 205, Houston 2, Texas — Phone No. CA 3-4048

FOR SALE

save $600. brand new—CONTINENTAL RED SEAL F-226—complete industrial power units 6 cyl. 73 h.p. elec. starting w/Twin Disc Clutch w/4:1 reduction. only $725.

save $300. brand new—WAYNE AIR COMPRESSORS—heavy duty 2 stage 2 cyl. 5 h.p. 3 phase 80 gal. w/all automatic controls, in orig. crates. only $590 delivered. Save $600. on 15 h.p. 4 cyl. compressor 120 gal. tanks only $1550. delivered.

save $50. brand new—WISCONSIN ENGINES—standard model AENLD 9.2 h.p. original crates only $119.

save $200. brand new portable —ELECTRIC GENERATING PLANTS—3500W 3:5 KW 110/220/v AC w/9 h.p. engine—volt meter — elec. starting — steel carrying frame etc. in original crates—only $329.

Please note: The above priced less than factory wholesale. All the merchandise is top grade and satisfaction guaranteed.

GEST MOTORS
2925 Ridge - Phila. 21, Pa.
Phone CEnter 6-4341

USED CONSTRUCTION EQUIPMENT

Michigan 375A 6 yard, tires excellent, Engine rebuilt in 1959, all latest factory improvements. Completely equipped with cab, heater, etc. Only $44,000.00

Caterpillar D-9 (TC) Series 19A with 9-S dozer and #29 D.D. cable control. A steal @ $24,000.00

Michigan 175A—three to choose from all diesel engines with 2¾ cu. yd. buckets, 18:00 size tires are excellent, engines good.

Hough HO two to choose from, one gas, one diesel. New Retreads, torque convertors, cabs, and one set of Drott logging forks your choice @ $16,995.00

CHADWICK-BA ROSS INC.
Concord, N. H. — CApitol 4-4063
Portland, Me. — SPruce 5-5687

DIESEL TRACTORS

10—1955 & 1955 R.D. 205 Internationals with J. T. Cummins Engines with Tag Axles.

4—1954 R.F. 195 Tandems 175" wheel base with 8 to 10 yard dump bodies.

A. J. RHIAN
International Truck Dealer
Phone NO 5-2527
YANKTON, SOUTH DAKOTA

FOR SALE

P&H Model 1055. 75 ton Erection Crane or 4 yd. 95 ft. Boom 10000 series, tagline, spare engine & parts, wide & long tracks, Koehler Light Plant, Independent Boom Hoist, High Gantry, Drag Bucket 85% new condition, can be bought for less than ⅓ of replacement cost. Tax loss.

CHARLES M. INGERSOLL CO.
ROCKY RIVER, OHIO — ED 1-4242

Attention Contractors

1959 Caterpillar	Model D-8	Series H, Bulldozer
1959 Caterpillar	Model D-7	Series D, Bulldozer
1959 Caterpillar	Model D-4	Bulldozer
1959 Caterpillar	Model 463	Tractor Drawn Scraper 19-27 cu. yds.
1959 Allis-Chalmers	Model 315	Tractor Drawn Scraper 15-19 cu. yds.

All Machines available for Rental Purchase, Rental or For Sale. Financing Available.

GIL WYNER CO., INC.
12 Newland St. — DA 2-8900 — Malden, Mass.

BRIDGE COL. FORMS

Steel Frame ¾ Plywood Skin 4 & 5 Foot Square Mfg. by Blaw Knox—½ original cost.

Walter D. Giertsen Co.
3501 Xenwood Avenue
Minneapolis 16, Minnesota

3—10'x78' Dryers—2'3'4'5½'7' Symons and Telsmith Cone Crushers—3648-4042-4872 Jaw Crushers and smaller sizes—48" Gyratory & 20" Gyratory Vibrating Feeders—other types of Feeders—Eagle Fine & Coarse Material Washers —Dixie Non Clog moving plate Hammermills—Asphalt Plants—Jaw—Cone—Gyratory—Roll Double and Triple—Hammermill and Impact Crushers—Ball—Rod—Tube Mills—Screening, Washing and Crushing Plants, Classifiers, Compressors, Conveyors, Cranes, Drills, Dump Cars, Dredges, Feeders, Hoists, Motors, Generators, Kilns, Dryers, Locomotives, Pumps, Screens, Shovels, Draglines, Transformers, Euclid Trucks.

STANLEY B. TROYER EQUIPMENT CO.
Box 97 — Phone 500 — Crosby, Minnesota

Quality Used Equipment

FOR SALE

Used Cleveland Model 320 Trencher, 1953, Serial #K-201, Cat D8800 Diesel Engine, 22" buckets - 24" cut, 8' digging depth. Excellent condition. Cost new $42,000.00 - Priced to move $21,250.00

Pusher Plate with Push Arms for TC12 Euclid Tractor. New - Never used.....$1,200.00

USED DRAGLINES. Rebuilt and ready to go. Good condition. See to appreciate.

Llewellyn Machinery Corp.
3127 Douglas Rd., Highland 4-7481
Miami, Florida

We are a *Nation-Wide* business in

STEEL SHEET PILING

FOR SALE OR RENT

80 pcs.	40 ft.	Z-32	Missouri
213 pcs.	60 ft.	MP-116	Illinois
160 pcs.	650-80 ft.	MP-115	Tennessee
218 pcs.	50-60 ft.	DP-2	New York
682 pcs.	40 ft.	MP-101	Indiana
473 pcs.	30 ft.	AP-3	Maryland
180 pcs.	25 ft.	DP-2	Penna.
280 pcs.	20 ft.	MP-112	Kansas

Storage yards at Buffalo - Baltimore - New Orleans - Memphis - Chicago
Also - H Bearing Pile

McKiernan - Terry and Vulcan Pile Hammers and Extractors - Construction and Railroad Equipment.

We are as close as your telephone—you can obtain Steel Sheet PILING BY DIALING CHestnut 1-4474, St. Louis, Mo. COLLECT

MISSISSIPPI VALLEY EQUIPMENT CO.
1906 Railway Exchange Bldg.
St. Louis 1, Mo. — CHestnut 1-4474

FOR SALE

BACKHOES

INSLEY—¾ Yd. —Powered by Buda Gas Engine. Very good condition.....$ 2,975.00

LIMA—(1958) Model 34—S/N 3341-85—Powered by HRC Cummins Diesel Engine. Used Approximately 10 months. Condition like new $23,750.00

COMPRESSORS

Reciprocating Type

SCHRAMM — 60 CFM — Skids — Good condition $550.00

CHICAGO PNEUMATIC 60 CFM—Powered by 4 cyl. Hercules Gas Engine, mounted on 2 pneumatic tires. Very good condition $675.00

JAEGER 75 CFM—Powered by 4 cyl. Continental Gas Engine, mounted on 2 Pneumatic tires. Completely rebuilt $975.00

Le Roi 105 CFM—Powered by Le Roi Gas Engine—skids. Good condition $695.00

WORTHINGTON 105 CFM—Powered by 6 cyl. Hercules Gas Engine—skids. Very good condition $1,575.00

DAVEY 125 CFM—Powered by Hercules Gas Engine—mounted on 2 pneumatic tires. Completely rebuilt $1,675.00

JAEGER 250 CFM—Powered by 4 cyl. International Diesel Engine—mounted on 4 pneumatic tires. Excellent condition..$2,975.00

CONCRETE FINISHERS

CHAMPION Model 360G—36"—Powered by Briggs & Stratton Engine. Completely rebuilt $225.00

WHITEMAN Model B—44"—Powered by Wisconsin Gas Engine. Completely rebuilt $295.00

MOTOR GRADERS

MEILI BLUMBERG Model 44—Powered by 4 cyl. International Gas Engine. Tandem Drive, Cab, and shiftable Moldboard. Good condition $1,250.00

MEILI PLUMBERG Model 44—Powered by 4 cyl. International Gas Engine. Tandem drive, cab, and shiftable Moldboard. Very good condition $1,500.00

ROLLERS

GALION—3/5 ton tandem, powered by 4 cyl. Wisconsin air-cooled engine. Completely rebuilt $2,875.00

GALION—10 ton—3 whl. (1958) powered by 6 cyl. Continental Gas Engine, with torque converter. Excellent condition....$5,750.00

STONE SPREADER

JAEGER Model SPS-1C—Crawler mounted—powered by 6 cyl. Continental Gas Engine. Completely rebuilt $3,950.00

Call—Wire—Write

W. F. RIPPEL

THE WESTPORT MACHINERY COMPANY

1801 Cherry Hill Road MUlberry 5-0402
Baltimore 30, Maryland

LOADERS

Pettibone	125A	1½ yd., gas power, rebuilt.
International	TD14	2 yd., rebuilt engine, new tracks.
Haiss	75W	Bucket Loader, on pneumatics.

HOES—DRAGLINES

Insley	K-12	Trench Hoe, gas power.
Link Belt	LS-51	Dragline, ½ yd. hydraulic control
Lorain	TL25K	Dragline, ¾ yd. Cat.
Schield Bantam	M49	Hoe-Drag, GMC 6x6 (4).

MISCELLANEOUS

Chicago Pneumatic 600 Portable Air Compressor, 1000 hours.
Rex 6 Yd. Adjusta-Wate Mixer, Chrysler power; on I-H 190, Air, 1000 x 20.

EIGHMY EQUIPMENT COMPANY

Pierpont at W. State St. WO 4-6706

Rockford, Illinois

ALL WHEEL DRIVE TRUCKS,

Bulldozers,
Cranes & Parts.

•

Impartial Inspections & Appraisals Made Anywhere - Anytime.

•

I can supply any type of Eqt. if it has been sold by Uncle Sam as Surplus. Try me and see!

•

Quotes made promptly to all interested buyers.

•

No order too small to receive prompt attention.

•

Only the best repossessed Eqt. sold at reasonable prices.

•

Satisfaction guaranteed.

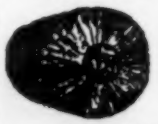
•

CALL - WIRE - WRITE

CHARLES SMITH

P. O. Box 231 Telephone
Silver Spring Washington, D. C.
Maryland Lockwood 5-5721

"BRUSH-UP" on BRUSHES



at DALLAS BRUSH!

Call "Mr. Van" — The Friendly Brush Man for NEW Specifications and New Low Prices.

Rotary Sweeper Broom Cores
Road Drag Leveler Brooms
Street Push Brooms

Brushes for Every Industrial Need

DALLAS BRUSH MANUFACTURING CO.

5108 Westmoreland FL 7-6581
N. S. VanDevanter, Owner

FOR SALE

1—Model 77 Parsons rebuilt Trencher, 16" and 18" Trench, 5 ft. depth. Used 10 months $5,970.00

1—Shovel Attachment for Model 205 Koehring. Never used $700.00

1—New Model 200 - 2¼ yd. Nelson Rubber Tired Loader - Diesel $16,000.00

ALAMO IRON WORKS

Box 231 - San Antonio, Texas

Unused PILE DRIVING OUTFITS

Less Than One-Half New Price

GOVT. SURPLUS
FINEST QUALITY

with 16' leads, 2000# hammer $600

with 26' leads, 2000# hammer $700

COMPLETE WITH CAP. CATWALKS F.O.B. Kansas City

Extra New 2000# Hammers $200.00 each

WENZEL MACHY. CO.

565 S. 10th St.
Kansas City, Kans.
Mayfair 1-1710

FOR SALE

105' Lippman radial stacking conveyor, self propelled	$ 7,500.00
Insley Crane Model K-12, in very good condition	5,200.00
Caterpillar D-6 Bulldozer	4,500.00
Int. TD-6 Dozer-Loader	2,750.00
2 12 Ton Low-boy Trailers.	Ea. 750.00
Michigan 175A Loader	13,500.00
Oliver OC3 Loader	1,500.00
1952 Ford Dump Truck & Tow Trailer	450.00
1955 GMC Tractor	575.00

Call before 8 AM or after 4:30 PM or all day Saturday and Sunday. Phone SAratoga 3-3152, Owasso, Michigan. Frank Fisher. Any reasonable offer carefully considered.

FOR SALE
CRANES & DRAGLINES

Northwest Model 25 Combination Crane/Dragline, 40-foot Boom, GM Diesel Power Unit, S/N 11908.

Northwest Model 6 Combination Clam Dragline - Powered with Murphy Engine - S/N 12715.

Northwest Model 6 Combination Clam/Dragline, powered w/Murphy engine S/N 17085.

Model 22-B Bucyrus-Erie Crane/Dragline - S/N 84818. Backhoe and Shovel Front available.

1—Cat. - D9-18A Series Tractor with Pcu & 9a Dozer.

8—Cat. DW-21 Motor Scrapers, 86 E Series.

Fehrs Tractor & Equip. Co.

1809-11 Cuming St. - Omaha 2, Nebraska
Ph. 341-3127

FRONT DRIVE TRUCKS

4—FWD & Oshkosh Dumps
7—GMC 6x6 & INT. 4x4 Chassis
6—Dodge 4x4 Weapon Carriers
85 Other Trucks—All Kinds & Sizes

HOFING TRUCK SALES - SINCE 1923
Trenton, N. J. EXport 6-2141

FOR SALE

WATER TREATMENT SOFTENER

1—Illinois Water Treatment Softener, capacity 14,000 gallons in 12 hours, flow rate 20 gallons per minute. Serial #12175. This is a de-alkalizing type softener and completely equipped with all controls for fully automatic operation. Equipment list: 1—36" x 72" cation tank, 1—36" x 144" anion tank, 1—24" x 48" brine measuring tank, 1—36" x 36" caustic solution tank, 1—24" x 60" caustic measuring tank, 2—auto. multiport control valves, 1—Badger meter, size 1½', 1—Taylor Flex-O-Timer. All equipment is in good condition, bought in 1953 and used 5 years. Still installed in plant and inspection is invited. Allison Tag #A-76608.

AIR FILTERS

17 Units American Multi-Duty Air Filters, 5' x 15', Model DD, Size 85-150, Serial #B-156511, with total capacity of 498,000 CFM, complete with (5) drive motors, 115 volt, 60 cycle, 1 phase.

24 Units American Electro-Matic Air Filters, 4' x 15', Model F, Size 96-150, Serial #F-356578, with total capacity of 498,000 CFM, complete with (6) drive motors, 115 volt, 60 cycle, 1 phase with 12 power pack and 2 instrument panels.

Filters have been installed, but never used. They are in excellent condition and may be inspected. Will sell "as is—where is."

DEEP WELL PUMP

1—6" Layne-Northern Deep Well Pump complete with 30 H.P. U.S. Motor mounted on common base, rated 500 GPM at 50 psig., with 6" gate valve, 4" check valve and motor shaft coupling 1800 RPM, frame 917, 220/440 V., 3 Ph., 60 Cy. Pump setting for 60' with water cooled intermediate bearings. Yr.: 1953. Allison Tag #A-81118.

WELDING ROD

2400# 5/32" rd. x 14" long Welding Electrodes, type 312 (AMS-5785), extruded lime coated. Mfg. Westinghouse and Alloy Rods Co.

17,670# 3/16" rd. x 14" long Welding Electrodes, type 312 (AMS-5785) extruded lime coated. Mfg. Westinghouse and Alloy Rods Co.

295# 3/16" rd. x 10" long Welding Electrodes Hasteloy "W", non-coated. Mfg. Haynes-Stellite Co.

The above is packaged in 10# tin containers and in good condition. A substantial saving can be effected to any user—all or part.

Any reasonable offer on above items will be considered.

ALLISON DIVISION

GENERAL MOTORS CORPORATION

Indianapolis, Indiana—Plant #3
D. C. Jarrett, Supv. By-Products Sales
Phone: CHapel 4-1511, Ext. 2343-4

FOR SALE: American 375 Crawler Crane - S/N GS1107 - Powered with G.M. #3030-C Diesel Engine - 50 ft. Boom, 12 ft. Jib, Farlinad Tagline, Swivel Hook, 12'-4" long Crawlers, 28" wide Pads. LIKE NEW!.....$15,000.00
F.O.B. Dover, Ohio

Brosco Equipment Corporation
DOVER, OHIO
Phone 72519 P. O. Box 432

FACTORY TRADE-INS

25 Ton	MARION 35-M TRUCK CRANE - Excellent 1957 model. 100 ft. Boom. Located Ohio.	#21780
2½ Yd.	NORTHWEST 95 DRAGLINE - Good 1950 Model, 80 ft. Boom. Located Pa.	#13222
¾ Yd.	MARION 35-M SHOVEL - Good 1958 Model. Located Kansas	#21812
3 Yd.	P & H 1055 SHOVEL - Good 1946 Model. Diesel engine, extra features. Located Illinois.	#10475
¾ Yd.	MARION 32-M DRAGLINE - Good 1955 Model, Gas Powered. Located Ohio.	#21369
2½ Yd.	P & H 955-A SHOVEL - Very good 1951 Model, Extra engine. Located Arizona.	#14944
1½ Yd.	MARION 362 DRAGLINE - Excellent 1959 Model, 2 Yd. Bucket. Located Ohio.	#22107
4 Yd.	MANITOWOC 4500 SHOVEL - Good 1955 Model, 60 ft. Boom. Located Ohio.	#4631
1 Yd.	MARION 43-M DRAG-CLAM - Good 1951 Model, 60 ft. Boom. Located Indiana.	#9426
1½ Yd.	MARION 362 SHOVEL - Good 1953 Model, 23 ft. Boom. Located Indiana.	#9892
2½ Yd.	P & H 855 DRAGLINE - Good 1946 Model, 75 ft. Boom. Located Pa.	#7957
1 Yd.	MARION 43-M SHOVEL - Good 1956 Model, Cat engine. Located Ohio.	#21456

MARION **POWER SHOVEL COMPANY**
MARION, OHIO

TWX-MRON 0 274-U
WESTERN UNION-WXMS MARION, OHIO

P.O. BOX 505
PHONE 2-1151

For Sale or Rent

1—Lorain 82
2 yd. dragline — hoe — or shovel. Unused government storaged machine. D-13000 Caterpillar engine.

1—Lorain 80
1¾ yd. Same as above, but Waukesha diesel engine.

1—Insley K-12. Unused, with Buda gasoline engine.

18—Lorain Moto-Cranes and self-propelled 7½ tons to 65 tons.

4—½ yd. draglines.

2—Lorain 1 yd. machines.

1—Lorain 1¼ yd., L-56 air controls with shovel available.

1—Buyers ½ yard shovel—very clean.

Miscellaneous items too numerous to mention, including 6000 lb.. wrecking balls, loaders, 50 ton lowboys, maintainers, dozers, yard cranes, etc.

"Your Thew-Lorain Dealer"

HEAD AND GUILD EQUIPMENT CO., INC.
5501 Navigation Houston, Texas
WA 3-2603

FOR SALE

MANITOWOC'S

1 Model 4500 Manitowoc Dragline - 6 Yard
1 Model 3900-B Crane, Drag, Clam.
1 Model 3000-B Manitowoc Erec. Crane, 140' Boom-Jib.
1 Model 3000-B Manitowoc Shovel.
1 Model 3500 Manitowoc Shovel.
1 Model 1201 Lima, Crane, Dragline.
1 Model 375 Link-Belt Dragline.
1 Model 111 Marion Shovel.
1 Model 605 Koehring Crane and Clam.
1 Model American 375 Truck Crane, 25 Ton.
1 Model 95 Northwest Drag and Clam Combination.
1 Model Northwest 25 Dragline.
1 Model Lorain K-50 Drag, Clam and Crane.

24-HOUR SERVICE

All Equipment Guaranteed 90 Days

MANITOWOC SALES & SERVICE COMPANY

2288 University Ave. St. Paul, Minn.
Midway 6-8889
4541 West 35th State Rd. Cleveland, Ohio
FL 1-1800
1420 Ulster St. Denver, Colorado
FL 5-2814

For Sale

Complete Crushing Spread

Consisting of:

30′ x 42″ Pioneer feeder.

32 x 40 Cedarapids jaw crusher.

30 x 42 Cedarapids Impactor secondary w/5′ x 14′ 3-deck screen.

Northwest 80-D Shovel ser. no. 20548.

Cat. D7 dozer ser. no. 17A-14586.

3 Mack Model LRX quarry trucks.

G-D 600 c.f.m. air comp.

G-D Air Trac drill.

G-D Air motor.

Damco Blastholer rotary drill.

Location near Huntsville, Texas

MILLER C. BEASLEY MACHINERY CO.
2237 W. Northwest Hwy.
¾ Mi. W. of Circle on Grapevine Hwy.
P. O. Box 6995
Phone: FI 7-8325
Night: RI 2-6101
Dallas, Texas

SAVES 60%

OF THE COST OF MEASURING DISTANCES

MAINCO DISTANCE MEASURING WHEEL

ONE MAN and a MAINCO WHEEL does it better, faster than 2 men using chain or tape

Send for descriptive folder

THE MAINTENANCE CO., INC. Dept. D
10-40 45th Ave., Long Island City 1, N. Y.

FOR SALE

1—ASPHALT PLANT

Barber Greene Model 848. Complete with portable steam generator Diesel Electric Generator Set and Auxiliary Asphalt Pump. Plant is serviced, clean, ready to go to work. Write for details.

1—ROADMIXER

Woods Model 54 with PTO for 2U Series Cat D-8, Chrysler Engine on accessories. Machine is clean, serviceable, ready to go to work. A bargain.

1—GENERATOR SET

Buda-Westinghouse Diesel Electric, 220 volt, 187.5 KVA, 60 cycle, 3 phase, complete with new control panel. A good unit. Ready to go. Bargain priced.

1—GENERATOR

Electric Machinery package, 30 KW, 480 volt, 60 cycle, 3 phase 1200 RPM. A serviceable unit. Use your power.

2—SCRAPERS

Le Tourneau Model CR. One with Cummins; one with GM engine. Workwise and serviceable as-is. Bargain priced. Can you use them?

1—DRAGLINE & SHOVEL COMBINATION

Lima 604, Cummins HIS Engine. Serviced, cleaned and painted, ready to go.

1—COAL PULVERIZER

Strong-Scott Mfg. Co. Uni-pulvo, Model C-40. Good mechanical condition, extra set of new hammers. Can you use it?

1—HAMMERMILL

H. E. Williams, old but workwise, plain bearing shaft. A bargain.

THE COLORADO BUILDERS' SUPPLY COMPANY
1300 West Evans Denver 2, Colorado
WEst 5-3571

EXPANSION

of
CONTRACTOR ACTIVITIES
PROVIDES
OPPORTUNITY
for
INVESTOR PARTICIPATION
IN DOMESTIC AND FOREIGN
WORK 1% PER MONTH MIN.
GUARANTEED RETURN ON

$100,000 Secured Investment

WRITE or PHONE
NORMAN S. BROOKE, Vice-President

Guardian Trust Company
MONTREAL, CANADA
Victor 2-8251

ATTACHMENTS AVAILABLE

Northwest - Bucyrus-Erie - Lima - Marion - Link-Belt - Lorain - P&H - Manitowoc - Shovel - Backhoe - Clam Drag - All sizes.

JAMES C. FRENCH
226 Berry Pkwy. - TAlcott 3-4927
P. O. Box 188 - Park Ridge, Illinois

Good Used Construction

EQUIPMENT

CRANES

BUCYRUS-ERIE 19B Crawler Dragline, 36" Pads, Int. UD-9 Diesel, ⅝th Yd. Bucket.
NORTHWEST #25, ¾ yd., Cat 318 Diesel $7,750
BUCYRUS-ERIE #10B, ⅜ yd., Backhoe, Dragline, Boom & Bucket, Trailer $4,950
INSLEY #K12, ½ yd., GM Diesel $3,500
BUCYRUS-ERIE Hydrocrane, #H2, mtd. on Int. Truck, with Clam Bucket... $3,000
GARWOOD Swing Crane, 20,000 lbs., mounted on Int. Truck $2,500

TRACTORS

CAT D7, Hydraulic Blade
CAT D6, 9U Series, Hyd. Angledozer...$7,500
CAT D2. with Cat Hyd. Angledozer....$2,500
CASE, Rubber-tired, Industrial.....$ 500
INT. TD-14, Hyd. Angledozer.....$1,950
INT. TD-14, Hyd. Angledozer

FRONT END LOADERS

JAEGER 1¼ yd., Torqmatic Drive, Power-steering, Waukesha Diesel.....$5,000
JAEGER 1¾ yd., Torqmatic Drive, Power-steering, Air Brake, Cummins Diesel..$6,500

ROLLERS

BUFFALO-SPRINGFIELD 3-Wheel, 10 Ton, 24" Rear Wheels, Int. #305 Diesel...$4,000
HUBER 3-Wheel, 10 Ton, Cat Diesel engine $4,000

GRADERS

CAT #12 Grader, 7-T Series.
CAT #12 Grader, 9-K Series
HUBER #HM, 4 valves $1,400

DITCHING MACHINES

CLEVELAND #110, Wheel Type $2,500

DOCKERY
Machinery Sales, Inc.
5105 N. W. 7th Street Ph. HI 8-2075
MIAMI 44, FLORIDA

CONVEYOR LINES FOR SALE

500′x24″ Conveyor Line.
200′x24″ Conveyor Line.
100′x30″ Conveyor Line.
All complete with belts, motors, pulleys.

FRANK FAMALETTE EQUIPMENT CO.
764 N. Locust St., Hazleton, Pa.
GL 5-4708 GL 5-4196

FOR SALE

Practically new Standard Model S-E 5000# portable asphalt plant.
In top condition. Has run about 100,000 tons.
This high production plant is extremely portable and can be moved cheaply. Only reason for disposal is because of owner's need for stationary plant.
Located in South.

Reply: P. O. Box 1234
Roads & Streets, 22 W. Maple St.,
Chicago 10, Ill.

MOTOR SCRAPERS

2 MODEL "C" LeTourneau "full pack" motor scrapers. Serial #GP40588 CPF-R, GP40585 CPF-R. GMC 671 engines 26.5x25 tires, excellent condition, $20,000 each. 1 model "C" E-18 scraper serial GM 9T 3713-CR, good condition, $7500.

VOGEL BROS.
P. O. Box 55, Farmingdale, N. Y. CH 9-0348

KOLMAN 303 Loader Handles 17 Cu.Yd. Loading Cycles in Twenty Seconds!

To supply dirt for a $1.3-million resurfacing and paving project, A. J. Baltes Co., Norwalk, O., put a Kolman Model 303 60-inch Loader to work on a hill two miles away.

Using 15 to 20 Euclid bottom dumps, Baltes was able to make as many as 1006 loads in a ten-hour day. The 60-inch belt of the 25-ton portable loader handled 15 and 17 cu. yd. loading cycles in as little as 20 seconds. Eight bulldozers, three of which had rippers and scarifiers mounted on them, broke loose the dirt and charged the 303 feeder-trap.

In the right foreground is the huge surge pile that covers the loader's entire feeder-trap and tunnel.

The Kolman 303 moves earth, sand, gravel, rock and similar materials on a gigantic scale by combining the economy of conveyor belt loading with the speed of dozer charging. The loader handles material at rates over 3600 yards per hour.

WRITE FOR LITERATURE **KOLMAN MANUFACTURING CO.**
5200 W. 12th St. Sioux Falls, S. D.

FOR SALE

(5) Euclid 13 yd. bottom dumps.
(4) Euclid 6 wheeler 14TDT rubber tired 15.5 cu. yd. scrapers.
(5) Rebuilt TS-24 Euclid twin engine rubber tired scrapers.
(1) Mod. TC-12 Euclid crawler tractor with dozer, used 5 months, rebuilt.
(1) Mod. TC-12 Euclid twin engine crawler tractor with pushblade, rebuilt.
(2) Used TS-360 Allis-Chalmers, 15 cu. yd. Scrapers, good condition, tires good.
(2) Used TS-300 Allis-Chalmers rubber-tired Scrapers, 14 yd. struck capacity. Good condition. 1955 machines.
(1) Used Model 25 Northwest Crane, S/N 18824 (1956). Powered by Murphy Diesel engine, fairlead, tagline, long crawlers, 28" shoes, excellent condition.

GIL BOERS EQUIPMENT COMPANY
7625 So. Kedzie Avenue, Chicago 52, Illinois Prospect 6-4000

FOR SALE

Erect Cranes - Draglines
Shovels - Backhoes

LATE MODELS—EXCELLENT CONDITION
Manitowoc 2000B, 3000B, 3500, 3900 and 4500.
Northwest 25, 6, 80D and 95 Models.
Bucyrus-Erie 22-B, 38-B, 51-B, 54-B.
Marion, Koehring, Link-Belt, Lorain, Lima and P&H long booms, wide long crawlers, diesel powered. In equivalent sizes available.

James C. French
SPECIALIZING ON:
Cranes - Drag - Clams - Shovels - Backhoes
P. O. Box 188 - 226 Berry Pkwy.
Park Ridge, Illinois TAlcott 3-4927

FOR SALE

DRAGLINES · SHOVELS · CRANES
All Makes and Models,
½ yd. to 35 yd.

EUCLIDS:
Rear, Bottom Dumps and Scrapers
"Other equipment available not listed above"

WILLIAM LUBRECHT, III
Construction Equipment
311 W. Diamond Avenue Hazleton, Pa.
Gladstone 5-4041 5-0253

USED EQUIPMENT FOR SALE OR RENT

IDEAL BRIDGE CONTRACTORS CRANE
1—LS-108 Link Belt—40 Ton Capacity, 100′ pin-connected boom, jib, reversing clutches both main drums, independent swing and travel, 3rd drum, GM 4-71 engine.

Adams 440 Grader—Cab and Power Steering.
Adams 220 Grader—Scarifier.
Adams 610 Grader—Power Steering, Scarifier & Cab.
Adams 303 Grader.
Galion 118 Grader—14:00 x 24 Tires.
Galion 450 Grader.
Allis-Chalmers Model D Grader.
2—L-W "C" Tournapulls with GM Engines & Fullpak Scrapers.
3—L-W "C" Tournapulls with Cummins Engines.
4—L-W "D" Tournapulls, all with Excellent Tires.
3—Allis-Chalmers TS-300 Motor Scrapers, Excellent Rubber.
Allis-Chalmers HD-6G Loader, Completely Rebuilt.
Case 1000 Loader with 2 Yd. Bucket.
Case 800 Loader.
Chester Double-drum Sheepsfoot Roller, Like New.
Ingram 12-ton 3-wheel Roller, GM Diesel Engine.
Ingram 12-ton 3-wheel Roller, Gasoline Engine.
Huber 7-ton 3-wheel Roller, Gasoline Engine.

Many Other Items
No Charge for Delivery in Indiana

Miller Machinery, Inc.
7255 W. Washington St.
Indianapolis, Indiana
Ph. CHapel 1-2511

FOR SALE

125 Hp. Full Automatic Cleaver-Brooks Steam Boiler. Combination gas and No. 5 Oil Burner. Re-tubed 1959....$4,400.00

PETER BAKER & SON
Lake Bluff, Illinois
Phone - Empire 2-3663

New Products

Continued from page 161

New Crawler Mount Backhoe

Hydraulic Machinery has announced a new model 480 crawler backhoe.

The new ½ yd. struck capacity unit is said to offer a high flotation with 3 psi using standard pads. The manufacturer states that the machine can work on any ground on which a man can walk. With wide pads the unit offers good flotation. Powered by a 70 hp, six cylinder gasoline engine, the Model 480 has a 360 deg. swing, digging depth of 15 ft., reach of 23 ft. and a dump height of 12 ft. 6 in. Unit can climb grades of 30 percent and its top speed is 1.5 mph. Overall width of the new crawler is 8 ft., which permits the Hy-Hoe to be transported without special permit. Three pump hydraulic system enables operator to work both boom and bucket while swinging. Boom, bucket and dipper stick motion are controlled through 6 double-acting hydraulic cylinders operating at 1500 psi.

Hydraulic Machinery Co., 1037 N. Astor St., Milwaukee 1, Wis.

For more details circle 141 on Enclosed Return Postal Card.

Portable Mixer

A new piece of equipment, has been patented by the Dotmar Industries, Inc.

The Porta-Mix is mounted on a 460 International Tractor equipped with a 260 IHC-Wagner front end loader unit. The Porta Mix is 100 percent hydraulically operated. It is controlled completely by the tractor operator. It is reported to quickly and thoroughly mix concrete, mortar, plaster, terrazo and road patch mixes. The material to be mixed is picked up by the bucket, or batched into the bucket, and mixed en route to where the material is to be used. Mixing screw can be operated at various speeds depending on the tractor rpm. Scret is operated in reverse to sweep out contents of bucket. Capacity of the Model No. 36 bucket is 7 cu. ft. Any size bucket mixers can be manufactured to fit tractor handling capacity.

Dotmar's Porta-Mix

The Porta-Mix can also be used for handling the loading and material moving jobs done by an ordinary front end bucket.

Dotmar Industries, Inc., 502 Hanselman Bldg., Kalamazoo, Mich.

For more details circle 142 on Enclosed Return Postal Card.

Asphalt Plant

A new asphalt plant reported to save as much as 40 per cent on producing bituminous black top, due to control from the pugmill to pavement, was announced by the Littleford Bros., Inc.

Delays are said to be eliminated because the hot mix truck is eliminated. The manufacturer reports that the plant is flexible enough to produce all types of black top mixes at a low

WHAT ABOUT YOU, MR. READER?

Are you still active in the field? Have you moved or changed your position?
Unless you send this information directly to use we can't be sure. Sometimes a reader's name is cut from the mailing list because we are not sure that our information as to name, title and address is right. *Your* name might be cut from the mailing list.

Don't Let This Happen to You

Even if you think we know all about you, please fill in the information requested below and send to us by return mail. Our auditors require proof of accuracy of our mailing list. *You* are the only person who can help us on this. Do it now before you forget, so you can be sure your magazine will always be properly addressed to you. New names cannot be added or old names retained on our list unless we have *all* this information. *Please print or type.*

ROADS AND STREETS DATE_____

22 WEST MAPLE STREET, CHICAGO 10, ILL.

☐ I do receive ROADS & STREETS and wish to continue to receive it.
☐ I do not receive ROADS & STREETS but would like to have it.

NAME

TITLE OR OCCUPATION

FIRM NAME OR GOVERNMENT DEPARTMENT (give street address)

CITY ZONE (if any) STATE
(If you have moved give *old and new* address)

SIGNATURE

cost. A complete line of auxiliary equipment is also available.

Littleford Bros., Inc., 453 East Pearl St., Cincinnati 2, Ohio

For more details circle 143 on Enclosed Return Postal Card.

Power Earth Drill

A new lightweight and easily portable power earth drill has been placed on the market by the McCulloch Corp.

The new gas-powered tool drills clean and straight holes for fences, soil

McCulloch Power Drill

testing or landscaping. The machine weighs 25 lb. without the augers. The drill can use either 6 or 9 in. augers. The rpm at full load is 6500. An automatic clutch disengages at idling speeds so the unit can be carried from place to place without shutting off engine.

McCulloch Corp., 6101 W. Century Blvd., Los Angeles 45, Calif.

For more details circle 144 on Enclosed Return Postal Card.

Snow and Ice Control

A pull-type spreader for ice and snow control is being offered in 1-ton size by Baughman Manufacturing Co., Inc.

The new compact model, named the Safety Spreader, has exceptional maneuverability that allows it to be used in confined areas where large spreaders would be impractical. It is particularly suited for use on sidewalks, ramps, runways, parking lots, driveways, playgrounds and similar places. It also capably handles conventional spreading on streets and highways. Salt, sand, cinders and other types of commonly used ice and snow removal materials can be applied with the unit. A belt conveyor powered by a wheel-mounted sprocket is used to empty the body. This arrangement synchronizes belt speed with ground speed, helping to assure a correct discharge rate at all times. The standard Safety Spreader can be pulled by a tractor or any unit equipped with a power takeoff attachment for operating the distributor spinner. Another version is furnished with an auxiliary engine that allows the Safety Spreader to be pulled by any type of vehicle available. Spreading pattern can be controlled at any width from 3 to 32 ft.

Baughman's Salt Spreader

Baughman Manufacturing Co., Inc., Jerseyville Ill.

For more details circle 145 on Enclosed Return Postal Card.

Photoelectric Lighting Control

A new photoelectric light control by Revere Electric Mfg. has been announced. Said to be light-sensitive, these switches automatically turn on outdoor lighting installations such as street lights and service station lights at predetermined levels of darkness and turn them off again when they are no longer needed.

The control consists of a cadmium sulphide photoelectric cell with a high

Revere's Photoelectric Control

dark resistance of plus 5 megohms, which is said capable of operating continuously carrying 500 milliwatts of power. Also featured is a hermetically sealed tungsten-mercury solenoid type switch with a load capacity of 20 to 30 amperes at 120 volts or 240 volts AC and an inrush current capacity of 130 amperes. Encased in a weatherproof, shock resistant butyrate housing, the control operates through a temperature range from minus 40 deg. F. to 165 deg. F

Revere Electric Mfg. Co., 7420 Lehigh Ave., Chicago 48, Ill.

For more details circle 146 on Enclosed Return Postal Card.

If it's faster hand uncoupling you want with more feet drilled per shift, use the rope-thread Brunner & Lay assembly. Request literature showing types and sizes available.

Brunner & Lay, Inc., 9300 King St., Franklin Park, Ill. *Est. 1882*, Plants & conversion shops: Albuquerque, Asheville, Birmingham, Dallas, Long Island City, Los Angeles, Philadelphia, Sacramento, Seattle, Yardley (Spokane), Lachine, P.Q.

Brunner & Lay

carbide ROK-BITS • DRILL RODS • INTRASET STEEL COUPLINGS, ADAPTERS, SECTIONAL STEEL, STRIKING BARS Standard or ROPE threads. MOIL POINTS, CLAY SPADES, ASPHALT CUTTERS, etc.

. . . for more details circle 284 on enclosed return postal card

MULTIROLL FILES

IDEAL FOR... **PLAT PLANS PROJECT PLANTS**

File constructed in 200 lbs. test corrugated container.

9 TUBE MODEL Tube I. D. 4⅛"			
MODEL NUMBER	0930	0936	0942
Size 13½x13½xL	31	37	43
Inside depth	30½	36½	42½
Price	$11.50	$12.00	$12.50

16 TUBE MODEL Tube I. D. 3⅛"			
MODEL NUMBER	1630	1636	1642
Size 13½x13½xL	31	37	43
Inside depth	30½	36½	42½
Price	$12.00	$12.50	$13.00

Color Med. Gray • F.O.B. St. Clair Shores, Mich.
SOLD DIRECT ONLY
25 and 49 Tube model avail. Write for brochure.

ROLL & FILE SYSTEMS, INC. P. O. BOX 3863 DETROIT 5, MICH

. . . for more details circle 336 on enclosed return postal card

Manufacturers' Literature

TUNNEL CONCRETE PROBLEMS: The successful solution to excavating and concreting problems encountered on 12 major tunneling projects are covered in this 28 pg. Master Builders Co. publication, Cleveland 18, Ohio.

This series of case histories explains how Pozzolith was used to solve concreting problems and will be valuable to tunnel project planning. Photos and text illustrate the construction techniques of highways, railways and water tunnels.

For more details circle 147 on Enclosed Return Postal Card.

POWER CONVERSION GUIDE: A 16 pg. static power conversion guide which explains this new field of controlled electrical power is being offered by the Hamilton Standard's Electronics Dept., Broad Brook, Conn.

The booklet outlines the advantages of static power equipment and provides useful comparisons between static and rotating electrical devices.

For more details circle 148 on Enclosed Return Postal Card.

SAFETY BELTS: A complete line of safety belts for worker protection and comfort is described in a bulletin just issued by Mine Safety Appliance Co., 201 N. Braddock Ave., Pittsburg 8, Pa.

The 8 pg. illustrated brochure provides details on various types of web or leather belts. Included are body-type, harnes-type, suspension-type and linemen type belts and straps. Information is also given on lanyards, shock absorbers and related equipment.

For more details circle 149 on Enclosed Return Postal Card.

ROTARY COMPRESSORS: A new bulletin, descriptive of its complete line of 125 cfm. rotary compressors, has been released by the Davey Compressor Co., Kent, Ohio.

Contents include 18 illustrations of important compressor design features and an explanation of operating principles. Compressors are available in skid-mounted utility models and as 2 wheel trailers. A choice of gasoline or diesel models is also possible.

For more details circle 150 on Enclosed Return Postal Card.

LUBRICATIONS: A new edition of "Almascol Gear and Bearing Lubricants," an 8 pg. two color brochure describes the characteristics and performance of Lubrication Engineers' exclusive product developments.

Available from Lubrication Engineers', P.O. Box 7128, Fort Worth, Texas, the booklet describes advanced wear-reducing agents which possess load-carrying strength with a low coefficient of friction. Discussed, also, are gear-and-bearing lubricant composition and functions.

For more details circle 151 on Enclosed Return Postal Card.

SPEED REDUCERS: A new 7 pg. bulletin describing its full line of gearmotors and "Line-O-Drive" coupled speed reducers has been announced by Howell Electric Motors Co., 16316 W. Seven Mile Rd., Detroit 35, Mich.

Gearmotors range from 1 to 150 hp., a.c.; single, double and triple reduction; with speeds as low as 7.5 rpm. They are available in AGMA Classes I, II and III; in open, closed and explosion proof enclosures. A wide variety of mountings are available.

For more details circle 152 on Enclosed Return Postal Card.

TRUCK MIXERS: Publication of three new bulletins describing each of three new Rex truck-mixer models added to its line has been announced by the construction machinery section of Chain Belt Co., Milwaukee, Wis.

Rex model 77, the economy model of the series, is functionally designed for ease of operation and maintenance. One of the new features includes simplified 2-speed, in-line transmission with 2 lever control designed and built by the company.

For more details circle 153 on Enclosed Return Postal Card.

ROCK DRILLS: An eight-pg. illustrated brochure entitled "Drilling Rock With Coupled Steels," detailing proper operational and maintenance procedures for coupled rock drill steels, now is available without charge from Thor Power Tool Company, 175 North State Street, Aurora, Illinois.

The Thor Bulletin No. 10815 discusses and illustrates correct rotation, drill, and feed control operations, starting a hole, proper feed, drilling, and lubrication practices, adding and removing steels, bit maintenance, and dust control.

For more details circle 154 on Enclosed Return Postal Card.

SYNCRO-RANGE-DRIVES: The Louis Allis Co., 427 E. Stewart St., Milwaukee 1, Wis., has recently announced the introduction of Bulletin 111 Syncro-Range-Drives, ranging in sizes 2 to 15 hp, and providing adjustable speed of synchronous induction motors running in exact synchronism over a wide range of speed.

The drive is an integrated system consisting of an adjustable frequency power supply, one or more Syncro-Speed drive motors, and a control panel. Adjustable frequency power is supplied from an AC alternator driven by a constant speed squirrel cage induction motor which provides infinitely adjustable speed through the mechanical interaction of adjustable discs and a ribbed belt. By adjusting the power supply output, the drive motors can be varied in speed over a wide range, maintaining exact synchronism of all motors at any fixed speed and also while increasing or decreasing speed. Control panel includes alternator field supply and all necessary controls for proper operation of the drive.

For more details circle 155 on Enclosed Return Postal Card.

TANDEM ROLLERS: Buffalo-Springfield, Springfield, Ohio, announced Deluxe Tandem Rollers are the subject of a new 4 pg. bulletin.

The new bulletin covers the KT-24E (8 to 12 ton) and KT-25E (10 to 14 ton) Deluxe Tandem Rollers. Both models are offered with torque converter drive as standard equipment. A 4-speed mechanical transmission is optional. Both models feature exclusive adjustable bevel gear final drive, fully enclosed armored frame, single unit power assembly, full working visibility, rigid frame construction, and other components.

For more details circle 156 on Enclosed Return Postal Card.

TRAXCAVATORS: Design and engineering details of the 966, largest of the company's wheel Traxcavator line, are described in a 12 page book just released by Caterpillar Tractor Co., Peoria, Ill.

The features which contribute to the quick response performance, versatility and operator safety and convenience are covered in detail in the new brochure.

For more details circle 157 on Enclosed Return Postal Card.

Best Location for LOS ANGELES and HOLLYWOOD

Starlite MOTEL

AIR-CONDITIONED, TV AND HI-FI, PHONES, POOL, COFFEE SHOP, SOUND-PROOFED ROOMS. ELEVATOR. CREDIT CARDS ACCEPTED.

Write for Brochure and Reservations
250 SILVER LAKE BLVD.
LOS ANGELES 4, CALIF.

With The Manufacturers

International Harvester Receives Citation

International Harvester Company's Construction Equipment Division has been awarded a citation by the U.S. Army Engineer School in recognition of the company's long association with the school in the development of training programs for military use of crawler tractors.

In a ceremony at Ft. Belvoir, Va., Brigadier General R. L. Jewett, school commandant, formally presented the citation to R. B. Bradley, IH divisional vice-president. In General Jewett's words: "Services rendered by International Harvester are indicative of the highest standards of cooperation between industry and the military establishment within a true democracy."

RUSSELL T. GRAY: Eugene L. Peterson, Gray executive, has been elected Vice President to fill the vacancy left by the late R. G. White. Peterson came to the company in 1955 and was recently appointed Account Executive.

OWEN BUCKET CO.: Harris G. Tiffany, Secretary-Treasurer of the Owen Bucket Co. and a member of the board of directors passed away recently, Owen announced.

U. S. STEEL CORP.: Robert S. Holmes has been appointed to the position of manager, highway construction marketing, in the market development division of United States Steel Corp. Holmes coordinates the combined efforts and interests of the corporation and its various divisions in support of the Federal Highway program and construction of the 41,000 mile Interstate system. He graduated from the Georgia Institute of Technology and has done work with the Federal Civil Defense Administration.

YALE & TOWNE: George E. Gunther of Elyria, Ohio, has been appointed domestic sales manager for the Trojan tractor shovel line of Yale & Towne Mfg. Co. Gunther will be headquartered at Trojan Divisions central office in Batavia, N.Y. Gunther served three years with the U.S. Navy as a lieutenant during World War II.

FLINTKOTE CO.: The appointment of J. D. Moran as assistant to the president of the Flintkote Co., was announced by G. J. Pecaro, president. In assuming his new duties, Mr. Moran will serve in various administrative activities and functions, handling special staff assignments under direction of the president. His headquarters will be in New York.

MINNEAPOLIS-MOLINE CO.: Edmund F. Buryan has been elected chief executive officer and member of the board by the directors of Minneapolis-Moline Co. Buryan resigned as marketing vice president of Sheaffer Pen Co. to head the management of Moline.

FIRESTONE: P. J. Sonneberger has been named manager of wheel and rim trade sales for the Firestone Steel Prod. Co. In his new office, Sonneberger will be in charge of sales to distributors throughout the country.

FAIRBANKS, MORSE & CO.: T. G. Lanphier, Jr., has been elected president of Fairbanks, Morse & Co. Lanphier, an outspoken advocate of stronger national defense and a growth of economy for America became vice-president of Fairbanks Whitney in 1960.

KOEHRING CO.: E. J. Goes, a veteran of 47 years with the Koehring Co., retired last December. During his tenure at the company he has served in sales, advertising and publicity departments. Goes plans to continue in some phases of advertising on a consulting basis.

LINK-BELT SPEEDER CORP.: R. A. Smith has been named sales manager of Link-Belt Speeder Corp. following a meeting of the company's board of directors. Smith began with the company in 1941. He served three years with the U.S. Marines in the South Pacific during WW II. He was recently appointed assistant sales manager.

HEIL CO.: The materials handling equipment business of the Ingersoll Kalamazoo Div. of Borg-Warner Corp. has been acquired by the Heil Co. Machinery and fixtures used in the production of the materials handling equipment will be moved from Kalamazoo to Milwaukee and will be operated as part of the Body and Hoist Div. of the Heil Co

EBASCO SERVICES, INC.: Robert H. Crone, Eng. Business Development Rep. of Ebasco Services Inc. passed away last December after a brief illness. He was 60 years old. Crone had served with the Ebasco people for almost 35 years. He joined the company in 1923 as a cadet engineer. Crone recently completed a 15 month special assignment with Princeton U. on Project Matterhorn, a thermonuclear fusion research and development facility authorized and directed by the U.S. Atomic Energy Commission.

TEXAS TRACTOR CO.: Miller Machinery Co. of Tyler, Texas, a distributor for the Allis-Chalmers Mfg. Co. has been succeeded by the Texas Tractor Co.

Business Meeting?

take advantage of the BELMONT 'know how'.

Overlooking Lake Michigan and Belmont Yacht Harbor. 12 minutes from the loop—direct busses at the door. Spacious parking. New Banquet and Meeting rooms accommodate up to 400 persons. Charming, new Mansion House Dining Room and unique Cocktail Room—The Dam Site.

700 Rooms & Suites
TRANSIENT & PERMANENT
Full Hotel Services
Singles . . from $9
Doubles . . from $13

F. J. PETITMAIRE
General Manager

Belmont Hotel

BITTERSWEET 8-2100
3172 NORTH SHERIDAN ROAD
CHICAGO

CALIFORNIA'S
welcome to the world

Miramar
and NEW TOWER

California's World-Famous Resort overlooking the Blue Pacific where Wilshire meets the sea. Twenty minutes from International Airport. 450 luxurious rooms and bungalows, all with television and radio. Complete convention facilities. Banquet rooms for up to 2,000, air-conditioned. Exciting new Venetian Room and Cantonese Room. Swimming pool Beautiful grounds and landscaped gardens. Rates from $8.

Across the U.S.A. and in HAWAII
MASSAGLIA
CREST OF GOOD LIVING
JOSEPH MASSAGLIA, JR., President

MASSAGLIA HOTELS
- SANTA MONICA, CALIF. Hotel Miramar
- SAN JOSE, CALIF. Hotel Sainte Claire
- LONG BEACH, CALIF. Hotel Wilton
- GALLUP, N.M. Hotel El Rancho
- ALBUQUERQUE, Hotel Francisco
- DENVER, COLO. Hotel Park Lane
- WASHINGTON, D.C. Hotel Raleigh
- HARTFORD, CONN. Hotel Bond
- PITTSBURGH, PA. Hotel Sherwyn
- CINCINNATI, O. Hotel Sinton
- HONOLULU Hotel Waikiki Biltmore

World-famed hotels
Teletype service—Family Plan

Index to Advertisers

Acme Iron Works 166
Alamo Iron Works 174
Alexson Equipt. Corp. 168
Allied Construction Equipment Company 171
Allied Materials Corp. 7
Allis-Chalmers .....14 & 15
American-Marietta Co. 45
Armstrong Co. 168
Asphalt Institute, The .....110 & 111
Austin-Western, Construction Equipment Division, Baldwin-Lima-Hamilton Corporation ..32 & 33

Baker, Peter, and Son 178
Barber-Greene Company ....142 & 143
Beaco Limited 176
Beasley, Miller C., Machinery Co. 168, 176
Beemsterboer, Sam 172
Bethleham Steel Company 3, 127
Blaw-Knox Company 21, 22, 23, 24
Boers, Gil, Equipment Company ...177
Boyd, Gene.....172
Brooke, Norman S. 176
Brosco Equipment Corporation 175
Brunner & Lay 179

Carlson Company, Fred, Inc. 169
Caterpillar Tractor Co. ..61, 62, 63, 64
Chadwick-Ba Ross Inc. 173
Chain Belt Company .....38 & 39
Chapin Cylinder Head Co. 172
Chase Engineering Co. 169
Clark Equipment Company, Construction Machinery Division .....116 & 117
Cleaver-Brooks Company 138
Cleveland Trencher Co., The 52
Cline, F. D., Paving Company 167
Colorado Builders' Supply Company, The 176
Colorado Fuel & Iron Corporation, The 16
Continental Machinery Corp. 50
Craig Company, Jay W. 167

Dallas Brush Manufacturing Co. 174
Dixon Valve & Coupling Co. 165
Dockery Machinery Sales, Inc. 176
Eighmy Equipment Company 174
Ensminger & Co., Inc. 168
Equipment Corp. of America 170
Etnyre & Co. 149
EUCLID Division of General Motors 71, 72, 73, 74

Famalette, Frank, Equipment Co. ...176
Fehrs Tractor & Equip. Co. ...170, 174
Finks 172
Fishel, Al, Co. 169
Fishel, Bill 172
Fisher, Frank 174
Ford Motor Company, Industrial Engine Department 112
Ford Motor Company, Tractor and Implement Division 31, 151
Ford Motor Company, Truck Division 10, 11, 12, 13
Forney's Inc 164
French, James C. 176, 177
Frink Sno-Plows, Inc 30
Fuller Transmission Division, Eaton Manufacturing Company... 36
Fulton Equipment Co., Inc. 170

Galion Iron Works & Mfg. Co. 18
General Equipment Co. 170
General Motors Corporation, Allison Division 175
General Motors Corporation, Chevrolet Motor Division ....28 & 29
General Motors Corporation, EUCLID Division 71, 72, 73, 74
General Motors Corporation, Truck & Coach Division 41, 42, 43, 44
Gest Motors 173
Giertsen, Walter D., Co. 173
Gilson Screen Co. 162
Golden Gate Equipment 172
Goodrich, B. F., Tire Co., Division of The B. F. Goodrich Company .....92 & 93
Good Roads Machinery Corporation..148
Guardian Trust Company 176
Gulf Machinery Company 168

Harper, W. L., Company, The.....167
Head and Guild Equipment Co., Inc. 175
Highway Equipment Company 51
Hocking Construction Co., George H. 169
Hofing Truck Sales 174
Hotel Belmont 181
Hotels Massaglia 181
Hotel Starlite 180
Hough Co., The Frank G. 96, 97, 98, 99
Huber-Warco Company 47
Hyman-Michaels Company 172

Illinois Machinery Company 170
Ingersoll, Charles M. 173
International Harvester Company, Construction Equipment Division 17
International Harvester Company, Farm Equipment Division .....Third Cover

Jackson Vibrators, Inc. ...Second Cover
Jaeger Machine Co. .....122 & 123
Johns-Manville 121

Kennedy's Van Brush Mfg. Co. 166
Kent Piling Co., Inc. 172
Koehring Company, Flaherty Department 6
Koehring Company—Buffalo-Springfield Division 134
Koehring Company, Koehring Division .....78 & 79
Kolman Manufacturing Co. 177
Kotal Company 156

Larson Construction Company 171
LeTourneau-Westinghouse Company .....84 & 85, 87
Lima Works, Construction Equipment Division, Baldwin-Lima-Hamilton Corporation ..34 & 35
Lindekugel, G. H., & Sons Inc. 167
Link-Belt Speeder Corporation .....106 & 107, 153
Llewellyn Machinery Corp. 173
Lubrecht, William III 177
Lubrication Engineers Inc. 161
Lufkin Rule Co., The 83

Mack Trucks, Inc. .....128 & 129
McConnaughay Mixers, Inc. 147
Maietta Trucking Contractors 172
Maintenance Co., Inc., The 176
Manitowoc Engineering Corp. .....104 & 105
Manitowoc Sales & Service Company 175
Marion Power Shovel Company 175
Miller Machinery Inc. 177
Mississippi Valley Equipment Co ...173
Motorola Communications & Electronics, Inc. 26
Mutual Truck Parts Co. Inc. 168

Neenah Foundry Company 46
Northwest Engineering Company ... 40

Oil Production & Equipment Co. ...172
Pettibone Mulliken Corporation 5
Pettibone Wood Mfg. Co. 103
Portland Cement Association ...91, 131

Reo Motor Truck Division, The White Motor Co. ....132 & 133
Republic Steel Corporation, Truscon Division 115
Rhian, A. J. 173
Ring Bros., Inc. 170
Rockwell-Standard Corporation 37
Roll & File Systems, Inc. 179
Ryan, George T., Co., The 167

Sherman Products, Ford Motor Co. .. 31
Smith, Charles 174
Standard Steel Corporation 25
Standard Steel Works, Inc. 137
Stoody Company 80
Surplus Liquidating Co. 168
Symons Clamp & Mfg. Co. 163

Texaco, Inc., Asphalt Sales Div. 49
Texaco, Inc., Lubrication Division .....8 & 9
Thompson Tractor 171
Timken Roller Bearing Company .....Fourth Cover
Transport Trailers Inc. 155
Trinity Dam Contractors 169
Troyer, Stanley B., Equipment Co. ..173

U.S. Pipe & Machinery Company ...170

Vandeventer Auto Sales 172
Vogel Bros. 176

Warren-Knight 156
Warren Manufacturing Co. 170
Wenzel Machy. Co. 174
Western Contractors Supply Co. 171
Western Services Corporation 172
Westport Machinery Company, The..174
Wheel Trueing Tool Company 157
Williams Mfg. Co., Hugh B. 27
Wisconsin Motor Corporation 48
Wylie-Stewart Machinery Co., Inc. ..167
Wyner, Gil, Co., Inc. 173

Dig up to 800 feet of trench an hour—6 to 12 inches wide, as deep as 6 feet—with International 340 and ladder-type trencher.

For toughest digging, as deep as 13¼ feet, team the International 460 with heavy-duty No. 95 backhoe.

For general purpose trenching to 10-foot depth the International 340 tractor and No. 65 backhoe offer outstanding value.

Fast, clean, low-cost trenching!

with International tractor stamina and economy

High capacity and on-the-job dependability are the true measures of low-cost digging and trenching. You get them *both* in the highest degree with International® 340 and 460 Industrial tractors. These rugged Internationals have the built-in strength and balance to let the operator crowd the backhoe bucket for full loads . . . even in the toughest kind of digging . . . and the *stamina* to stand up in heavy-duty service long after more lightly built units have "had it."

Keep costs down—match tractor size to your range of jobs. The husky International 340 is a four-cylinder tractor—gasoline or Diesel—for 10 or 12½-foot backhoes and 1,600-pound loader capacity. The mighty International 460 is powered by six-cylinder, Multi-Range gasoline or Diesel engine. It has the power and weight balance for 12½ or 13¼-foot backhoes—lifts up to 2,500 pounds with front end loader.

The IH Dealer near you will be glad to give you full information—demonstrate if you wish. See for yourself the quality of construction . . . the convenience of operation . . . that put International 340 and 460 tractors in a class by themselves for high-production digging and trenching.

INTERNATIONAL HARVESTER

Index to Advertisers

Acme Iron Works 166
Alamo Iron Works 174
Alexson Equipt. Corp. 168
Allied Construction Equipment Company 171
Allied Materials Corp. 7
Allis-Chalmers .....14 & 15
American-Marietta Co. 45
Armstrong Co. 168
Asphalt Institute, The .....110 & 111
Austin-Western, Construction Equipment Division, Baldwin-Lima-Hamilton Corporation ..32 & 33

Baker, Peter, and Son 178
Barber-Greene Company ....142 & 143
Beaco Limited 176
Beasley, Miller C., Machinery Co. 168, 176
Beemsterboer, Sam 172
Bethleham Steel Company 3, 127
Blaw-Knox Company 21, 22, 23, 24
Boers, Gil, Equipment Company ...177
Boyd, Gene.....172
Brooke, Norman S. 176
Brosco Equipment Corporation 175
Brunner & Lay 179

Carlson Company, Fred, Inc. 169
Caterpillar Tractor Co. ..61, 62, 63, 64
Chadwick-Ba Ross Inc. 173
Chain Belt Company .....38 & 39
Chapin Cylinder Head Co. 172
Chase Engineering Co. 169
Clark Equipment Company, Construction Machinery Division .....116 & 117
Cleaver-Brooks Company 138
Cleveland Trencher Co., The 52
Cline, F. D., Paving Company 167
Colorado Builders' Supply Company, The 176
Colorado Fuel & Iron Corporation, The 16
Continental Machinery Corp. 50
Craig Company, Jay W. 167

Dallas Brush Manufacturing Co. 174
Dixon Valve & Coupling Co. 165
Dockery Machinery Sales, Inc. 176
Eighmy Equipment Company 174
Ensminger & Co., Inc. 168
Equipment Corp. of America 170
Etnyre & Co. 149
EUCLID Division of General Motors 71, 72, 73, 74

Famalette, Frank, Equipment Co. ...176
Fehrs Tractor & Equip. Co. ...170, 174
Finks 172
Fishel, Al, Co. 169
Fishel, Bill 172
Fisher, Frank 174
Ford Motor Company, Industrial Engine Department 112
Ford Motor Company, Tractor and Implement Division 31, 151
Ford Motor Company, Truck Division 10, 11, 12, 13
Forney's Inc 164
French, James C. 176, 177
Frink Sno-Plows, Inc 30
Fuller Transmission Division, Eaton Manufacturing Company... 36
Fulton Equipment Co., Inc. 170

Galion Iron Works & Mfg. Co. 18
General Equipment Co. 170
General Motors Corporation, Allison Division 175
General Motors Corporation, Chevrolet Motor Division ....28 & 29
General Motors Corporation, EUCLID Division 71, 72, 73, 74
General Motors Corporation, Truck & Coach Division 41, 42, 43, 44
Gest Motors 173
Giertsen, Walter D., Co. 173
Gilson Screen Co. 162
Golden Gate Equipment 172
Goodrich, B. F., Tire Co., Division of The B. F. Goodrich Company .....92 & 93
Good Roads Machinery Corporation..148
Guardian Trust Company 176
Gulf Machinery Company 168

Harper, W. L., Company, The.....167
Head and Guild Equipment Co., Inc. 175
Highway Equipment Company 51
Hocking Construction Co., George H. 169
Hofing Truck Sales 174
Hotel Belmont 181
Hotels Massaglia 181
Hotel Starlite 180
Hough Co., The Frank G. 96, 97, 98, 99
Huber-Warco Company 47
Hyman-Michaels Company 172

Illinois Machinery Company 170
Ingersoll, Charles M. 173
International Harvester Company, Construction Equipment Division 17
International Harvester Company, Farm Equipment Division .....Third Cover

Jackson Vibrators, Inc. ...Second Cover
Jaeger Machine Co. .....122 & 123
Johns-Manville 121

Kennedy's Van Brush Mfg. Co. 166
Kent Piling Co., Inc. 172
Koehring Company, Flaherty Department 6
Koehring Company—Buffalo-Springfield Division 134
Koehring Company, Koehring Division .....78 & 79
Kolman Manufacturing Co. 177
Kotal Company 156

Larson Construction Company 171
LeTourneau-Westinghouse Company .....84 & 85, 87
Lima Works, Construction Equipment Division, Baldwin-Lima-Hamilton Corporation ..34 & 35
Lindekugel, G. H., & Sons Inc. 167
Link-Belt Speeder Corporation .....106 & 107, 153
Llewellyn Machinery Corp. 173
Lubrecht, William III 177
Lubrication Engineers Inc. 161
Lufkin Rule Co., The 83

Mack Trucks, Inc. .....128 & 129
McConnaughay Mixers, Inc. 147
Maietta Trucking Contractors 172
Maintenance Co., Inc., The 176
Manitowoc Engineering Corp. .....104 & 105
Manitowoc Sales & Service Company 175
Marion Power Shovel Company 175
Miller Machinery Inc. 177
Mississippi Valley Equipment Co ...173
Motorola Communications & Electronics, Inc. 26
Mutual Truck Parts Co. Inc. 168

Neenah Foundry Company 46
Northwest Engineering Company ... 40

Oil Production & Equipment Co. ...172
Pettibone Mulliken Corporation 5
Pettibone Wood Mfg. Co. 103
Portland Cement Association ...91, 131

Reo Motor Truck Division, The White Motor Co. ....132 & 133
Republic Steel Corporation, Truscon Division 115
Rhian, A. J. 173
Ring Bros., Inc. 170
Rockwell-Standard Corporation 37
Roll & File Systems, Inc. 179
Ryan, George T., Co., The 167

Sherman Products, Ford Motor Co. .. 31
Smith, Charles 174
Standard Steel Corporation 25
Standard Steel Works, Inc. 137
Stoody Company 80
Surplus Liquidating Co. 168
Symons Clamp & Mfg. Co. 163

Texaco, Inc., Asphalt Sales Div. 49
Texaco, Inc., Lubrication Division .....8 & 9
Thompson Tractor 171
Timken Roller Bearing Company .....Fourth Cover
Transport Trailers Inc. 155
Trinity Dam Contractors 169
Troyer, Stanley B., Equipment Co. ..173

U.S. Pipe & Machinery Company ...170

Vandeventer Auto Sales 172
Vogel Bros. 176

Warren-Knight 156
Warren Manufacturing Co. 170
Wenzel Machy. Co. 174
Western Contractors Supply Co. 171
Western Services Corporation 172
Westport Machinery Company, The..174
Wheel Trueing Tool Company 157
Williams Mfg. Co., Hugh B. 27
Wisconsin Motor Corporation 48
Wylie-Stewart Machinery Co., Inc. ..167
Wyner, Gil, Co., Inc. 173

Dig up to 800 feet of trench an hour—6 to 12 inches wide, as deep as 6 feet—with International 340 and ladder-type trencher.

For toughest digging, as deep as 13¼ feet, team the International 460 with heavy-duty No. 95 backhoe.

For general purpose trenching to 10-foot depth the International 340 tractor and No. 65 backhoe offer outstanding value.

Fast, clean, low-cost trenching!

with International tractor stamina and economy

High capacity and on-the-job dependability are the true measures of low-cost digging and trenching. You get them *both* in the highest degree with International® 340 and 460 Industrial tractors. These rugged Internationals have the built-in strength and balance to let the operator crowd the backhoe bucket for full loads . . . even in the toughest kind of digging . . . and the *stamina* to stand up in heavy-duty service long after more lightly built units have "had it."

Keep costs down—match tractor size to your range of jobs. The husky International 340 is a four-cylinder tractor—gasoline or Diesel—for 10 or 12½-foot backhoes and 1,600-pound loader capacity. The mighty International 460 is powered by six-cylinder, Multi-Range gasoline or Diesel engine. It has the power and weight balance for 12½ or 13¼-foot backhoes—lifts up to 2,500 pounds with front end loader.

The IH Dealer near you will be glad to give you full information—demonstrate if you wish. See for yourself the quality of construction . . . the convenience of operation . . . that put International 340 and 460 tractors in a class by themselves for high-production digging and trenching.

INTERNATIONAL HARVESTER

"WE CHOSE TIMKEN® CARBIDE INSERT BITS FOR CONSISTENT PERFORMANCE"

Special report from Channel Constructors

•

LOCATION: Niagara Falls Power Project

•

OPERATING CONDITIONS: Rock-Lockport Dolomite

Reports from the Niagara Po ver Project prove again that Timk en® carbide insert bits give the n ost economical service. Timken bits were used in drilling the 50(ft. wide, 100 ft. deep cut show at the right. Channel Construc ors chose Timken carbide insert bits because of their consistent per-formance on the rock drill ng phase of this project. Users of Timken bits everywhere rep ort such savings — more feet-per bit, longer bit life, fewer lost ho es.

Which Timken Bit should you use?

Your most economical bit for hard, abrasive ground is the Timken carbide insert bit. In softer ground, use the low-cost Timken all-steel multi-use bit. Because both bits are interchangeable in the same thread series you can switch bits when the ground changes. Dozens of different Timken bits fit the same drill steel. Both types are made from Timken electric furnace fine alloy steel, have special shoulder unions that protect threads against drilling impact. Let us help you select the Timken bit that will do the most economical job for you. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

TIMKEN®

removable rock bits

. . . for more details circle 342 on enclo d return postal card